A

TREATISE
ON THE
CULTURE
OF THE
PINE APPLE
AND THE
MANAGEMENT
OF THE
HOT-HOUSE.

TOGETHER
WITH A DESCRIPTION OF EVERY SPECIES OF
INSECT
THAT INFEST HOT-HOUSES, WITH EFFECTUAL METHODS OF DESTROYING THEM.

THE SECOND EDITION, WITH ADDITIONS.

By WILLIAM SPEECHLY.

K

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BRITISH MUSEUM

TO

His GRACE

THE

DUKE of PORTLAND,

&c. &c. &c.

MY LORD,

THE motives which induced me to requeſt your Grace to take the firſt Edition of this Work under your Protection, have been ſo fully juſtified by the event, that I truſt your Grace will not refuſe the continuance of that

Patronage, the advantage and honour of which my gratitude is unequal to expreſs.

I have the honour to be,

My Lord,

Your Grace's

Moſt dutiful ſervant,

Wᴹ. SPEECHLY.

BRITISH MUSEUM 11 JA 77

PREFACE.

GARDENING, as well as Agriculture, has received great improvement from the induſtry of the preſent age; nor indeed is this to be wondered at, when we ſee ſo many of the firſt Characters in this country daily exerting themſelves in ſupport of this elegant and uſeful art, no branch of which has been deemed more important than that which comprehends the management and conſtruction of ſtoves, for the purpoſe of producing fruits and flowers. I therefore preſume that a Treatiſe, which has for its chief object the culture of the Pine Apple, and the preſervation of that plant from the various attacks to which it has been hitherto expoſed, will not be unacceptable to the admirers and encouragers of Gardening: More particularly when they are informed that the following ſheets contain the reſult of many years attention and experience.

A good ſtove, well managed, affords an agreeable mixture of *profit* and *pleaſure*, as well by accelerating the growth of many excellent kinds of indigenous vegetables, as by furniſhing us with a variety of fruits and flowers, the natives of a warmer climate: and all theſe too in ſuch perfection, and at ſuch various ſeaſons, as muſt ever be productive of amuſement and advantage.

It alſo affords a ſource of pleaſure of a ſtill different nature, eſpecially to thoſe who reſide much in the country: For as many months intervene between the firſt formation of fruits, and the time of their perfection, there is an almoſt daily variety, which occupies, and at the ſame time relieves, the ſpeculative mind when oppreſſed by long attention to objects of buſineſs or ſtudy.

The culture of the Pine has already been treated of by many perſons, who have varied much in the methods they have recommended. Far from meaning to depreciate their labours, I ſhall only obſerve, that my advice and pretenſions reſt ſolely upon the ſucceſs which I have met with in my experiments.

As the vegetable mould, from decayed leaves, is uſed in the compoſt for the Pine Apple plant; and as the uſe of Oak-leaves in Hot-houſes is a very important article of information, I have given the proceſs of that method at the end of the firſt book.

It being a practice with ſome to fruit the Pine by ſetting the *pot* in water; while others produce the fruit by ſetting the *plant* only in water, (in a ſimilar manner to what is often practiſed with Hyacinths and other bulbous roots) the paſſing over theſe methods in ſilence may, by ſome, be deemed an omiſſion: But as neither of theſe methods can be reduced to practice with any kind of ſucceſs except on fruiting plants, and juſt in the hot ſummer months, when the ſituation of the plant ought to be very near to the glaſs, they do not ſeem calculated for general practice.

However, as ſome perſons are inclined to ſuppoſe that Pines raiſed by theſe methods

thods are generally of ſuperior quality, I ſhall juſt beg to ſay, that the firſt method of ſetting the *pot* in water is greatly to be preferred, and that the beſt time for adopting it is immediately after the plants have ſhewn fruit in the ſpring.

Hot-houſes are now in general uſe, and the culture of the Pine Apple is, in ſome ſort, underſtood by almoſt every Gardener, not one of whom but concurs in lamenting the injury to which this plant is liable from two ſpecies of inſects, which are generally imported along with it. Theſe are now become too common in moſt ſtoves. And as the nature of theſe inſects is not clearly underſtood, and as ſome have been of opinion that there is no difference of ſpecies between them, I have given figures of each: To theſe I have added the *Coccus*

Heſperidum, it being alſo generally found upon the Pine Apple plant.

I eſteem myſelf greatly indebted to my late very ingenious and learned friend the Rev. Mr. Michell, who enabled me to give a better deſcriptive and hiſtorical account of theſe inſects, than I otherwiſe could have done without his kind and friendly aſſiſtance.

Very many methods have been taken to extirpate theſe inſects, moſt of which, on trial, have been found ineffectual; or, what is more unfortunate, have in a manner deſtroyed the plant itſelf.

It is no uncommon idea that there are methods of keeping the inſects down, ſo as to prevent their doing any material injury: But it is well known to every one converſant with their manner of breeding, that their increaſe in the ſummer months is exceedingly rapid, and that there are few methods uſed to expel them that do not injure the plants in a greater or leſſer degree: Therefore conſtant and repeated applications, for the purpoſe of deſtroying the inſects, muſt neceſſarily be a continual check to the growth of the plants. Theſe circumſtances point out the neceſſity of a never-failing remedy; and ſuch I am warranted, by experience, to offer to the Public.

It became my indiſpenſible duty to lay down, with the moſt exact preciſion, the method I practiſed in deſtroying theſe inſects: And that I have done with truth and ſincerity. The few cautionary remarks, that are encloſed between [crotchets] may be uſed or omitted at the option of the perſon who puts the method in practice. However, I could wiſh to recommend that the principal part of the directions, ſo marked, ſhould be adopted; eſpecially as they are not attended with much additional expence.

There is the greateſt probability that a much eaſier method may yet be practiſed, than that which I have hitherto purſued, and that the inſects on Pines may be deſtroyed by infuſing Quickſilver in the water kept for the uſe of the Hot-houſe. This, however, I only give as a probable ſpeculation, becauſe after I had deſtroyed all the inſects on the Pines in the ſtoves of which I had the care, I was deprived of the means of making any farther experiments.

It may be objected by ſome, that ſimple water is not capable of taking any thing from the Quickſilver, and that I ſhould have propoſed other methods to keep that metal in a ſtate of ſuſpenſion. In anſwer to this I ſhall only obſerve, that as the compoſition I have recommended for the deſtruction of inſects had never failed me, I judged it unneceſſary to make any alteration in it. Such perſons as chuſe to enter upon a courſe of experiments, in which the ſuſpenſion of Quickſilver in water becomes neceſſary, will be able to produce that effect, by means of a ſtrong mucilage of Gum Arabic; and indeed many other ſubſtances are capable of performing that office.

Beſides the inſects which infeſt the Pine Apple plant, there are other kinds that infeſt Hot-houſes, and which are very prejudicial to moſt kinds of plants, viz. The viz. The *Aphis*, the *Acarus* or *Red Spider*, the *Thrips*, the *Oniſcus* or *Woodlouſe*, the *Formica* or *Ant*, and the *Grillus* or *Cricket*. A deſcription of theſe inſects, and the different methods of deſtroying them, compoſe the third book.

I was induced to make this addition to the work, from the ſatisfactory reſult of ſome experiments I made on the deſtruction of the *Acarus* or *Red Spider*, which is well known to be very deſtructive to many plants when kept under glaſs, particularly to the Vine.

Although ſome of theſe laſt-mentioned inſects are very common with us, yet as others of them are not generally underſtood, I have given the claſſes, and a deſcription of each ſpecies (taken with little deviation) from "Inſtitutes of

Entomology"* publiſhed by Mr. Yeats.

Since the firſt edition of this work was publiſhed (1779) there have been many improvements made in the branch of Gardening herein treated of, and particularly in the uſe of Steam in the Pine-ſtove and in Forcing-houſes.

The new method of burning lime in ſtove fire-places may alſo be conſidered as an acquiſition on the ſcore of improvement. Theſe practices I have endeavoured fully to elucidate and further to explain by Plates.

There have alſo been many new and valuable kinds of the Pine Apple plant introduced into the Pine-ſtoves in this Country from various parts of the Globe. In this work a deſcription of theſe may be conſidered as a neceſſary piece of information: But I have deemed it proper only to deſcribe ſuch kinds as have come within my own immediate knowledge, and that are actually cultivated in the Pine-ſtoves in Welbeck Garden.

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* This judicious introduction to Entomology, is ſelected from the following celebrated authors, viz. Linnæus, Geoffroy, Scopoli, and Schæffer, to which the author has added many ingenious remarks.

I muſt beg leave to preſent my moſt grateful acknowledgments to my very excellent, worthy, and learned friend Dr. A. Hunter: His kind aſſiſtance and friendly attention to this work during the time it was in the preſs, has greatly contributed towards rendering it more worthy of the public approbation.

W. SPEECHLY.

WELBECK,
JANUARY 1, 1796.

ON THE CULTURE OF THE PINE APPLE, &c.

BOOK I.

HOT-HOUSES are found by experience to be of ſo much importance, that no garden is eſteemed complete without one. A good Hot-houſe, indeed, may be conſidered as a kind of garden itſelf, as it furniſhes both fruit and vegetables much earlier in the ſpring than they could be obtained by any other means; it alſo affords an opportunity of raiſing, with great eaſe, many exotic plants, as well for the uſe of the Table as the ornament of the Flower Garden.

But though the original and principal object of an Hot-houſe conſiſts in bringing the tropical fruit, called the Ananas, or Pine Apple, to a conſiderable degree of perfection; yet, if properly conſtructed, it may, at the ſame time, be equally well adapted to the culture of the Vine.

Of late years great improvements have been made in reſpect to the conſtruction, as well as the ſituation of Hot-houſes; and on both of theſe articles their ſucceſs very eſſentially depends.

Various are the opinions of the perſons who have written on the cultivation of the Pine Apple. In this attempt of mine, I am far from meaning to depreciate the labours of thoſe who have gone before me, the only purpoſe of this Tract being to communicate ſuch obſervations as have ſuggeſted themſelves to me, during an experience of between thirty and forty years in Pine Stoves.

On the Varieties of the Pine Apple Plant.

IT would be an endleſs, as well as unneceſſary trouble, to enumerate all the varieties of the Pine Apple plant, many of which are of no other value than to be kept in Botanic Gardens for their various diſtinctions.

In the year 1768 I raiſed above ſeventy Pine Apple plants from ſome ſeeds that were ſent to the Duke of Portland from the Weſt Indies, moſt of which varied in ſome diſtinctive circumſtance, either in their leaves, or fruit.

The reſult of this experiment did not however terminate equal to my wiſhes;

for although the new varieties thus obtained were, in general, fruit of great elegance and beauty, yet many of them turned out of inferior quality. Probably the ſeed might have been ſaved from Pines indiſcriminately; and I have been informed that for want of attention, many inferior kinds of Pines are cultivated in ſome of the Weſt India Iſlands; in general inferior kinds of Fruit are commonly the moſt prolific.

As new kinds of the Pine Apple plant may conſtantly be raiſed from ſeed, I ſhall not dwell on the ſubject of its varieties, but ſhall only mention ſuch as are in moſt general cultivation, or as appear to me to deſerve a place in modern ſtoves.

1. The QUEEN PINE. This is the moſt common of all the kinds in this

country. The fruit is large and well formed. Its fleſh is of a fine yellow colour, but in the hot ſummer months it is very apt not to cut firm; is liable to crack in the middle, and often contains a very inſipid watery juice: but when it ripens late in the year, it is not ſubject to any of theſe defects.

Although the Queen Pine is of inferior quality to ſome of the new-acquired kinds, ſtill, as it is much more certain of ſhowing fruit at a proper age and ſeaſon than moſt of the other ſorts, it continues to be cultivated on that account in many Hot-houſes in preference to the reſt.

2. BROWN ANTIGUA PINE, commonly called the BLACK ANTIGUA. This is a very large fruit, at firſt of a greyiſh black colour, but becomes yellow as it approaches maturity. The fleſh a pale

yellow, and more melting than any other ſort, abounding with a quick lively juice of an exquiſite flavour; eſpecially when cut juſt on the point of changing from green to yellow. In the hot months this Pine ſhould be cut on the firſt appearance of ſuch a change: but late in the autumn it ſhould be permitted to attain a yellow colour; and even then it is ſometimes too tart to be reckoned agreeable.

This kind is very diſtinguiſhable by its leaves, which grow very long, narrow, and are of a dark green tinged with a pale purple, or browniſh colour.

3. ANTIGUA QUEEN PINE. This is a large fruit, and when well formed, is a moſt handſome Pine: But early in the ſeaſon if the plants receive a check at the time of ſhowing, it generally produces imperfect, crooked, and miſ-ſhapen

fruit. The fleſh is of a pale yellow colour, but leſs delicate and leſs excellent than that of the former. The leaves are very coarſely indented at the edges, grow much broader, but not near ſo long as thoſe of the former. Both the Antigua Pines are remarkable for having large ſwelled protuberances, as well as for producing ſecondary ſuckers under the fruit, much more numerous than thoſe of other ſorts.

4. PROVIDENCE PINE. This produces a larger ſized fruit than any of the kinds cultivated in this country: inclining to a pyramidical form, at firſt it is of a browniſh grey colour, but on the approach of maturity it changes to a pale yellow. The fleſh inclines to yellow, and is more melting than moſt other ſorts. It abounds with a very quick lively juice, nearly ſimilar to the BROWN

ANTIGUA, to which it ſeems ſomewhat allied.

The leaves are long, a little like thoſe of the BROWN ANTIGUA, but leſs keel-ſhaped, and grow more broad than the other ſorts. They are of a greyiſh green, tinged with a lively pink or purple colour.

A fruit of this moſt excellent Pine was produced in the Gardens at Welbeck in 1794, that weighed 5¼ lb. or 84 oz. and from a plant that was not a large one.

This valuable fruit may be conſidered as a great acquiſition to the Pine Stove. But it is much to be regretted that it ſhould require ſo long a period in bringing the plants to a fruiting ſtate: I have been informed they ſometimes do not come into fruit before the fifth or ſixth year.

There ſeems to be a variety of the Providence Pine, with a fruit more pyramidically formed, and having narrower leaves of a deeper green colour.

5. ST. VINCENT'S PINE. This is a middling ſized Pine of a pyramidical form, at firſt of a black green, but when ripe changes to a yellowiſh olive colour. The fleſh, which is yellow, is compact, melting, and abounding with a very rich and high-flavoured juice.——But when this fruit comes late in the ſeaſon, it is very ſubject to decay before it arrives at a mature ſtate.—The leaves of this moſt excellent Pine are diſtinguiſhable from thoſe of the other ſorts. They are in length ſimilar to thoſe of the Queen Pine, but are not of ſo dark a green colour; are finely indented at the edges, and very narrow.—This is by ſome called the GREEN OLIVE PINE.

6. Sugar-Loaf Pine. This is a large, elegant, tall fruit of a pyramidical form; at firſt of a pale green, but when near ripe changing to a fine yellow colour. The fleſh is firm, of a deep yellow, and abounding with a quick lively juice of exquiſite flavour. But the fleſh of this Pine is more hard (ſometimes inclinable to be ſtringy) and leſs delicate than ſome of the other ſorts.

I have been informed that the Sugar-Loaf Pine is in the firſt eſtimation, and almoſt generally cultivated at Barbadoes.

There are three varieties of the Sugar-Loaf Pine: 1. The brown-leaved. 2. The green-leaved, with purple ſtripes and ſpines on the edges. 3. The green-leaved, with purple ſtripes and ſmooth edges. This laſt ſort is at preſent the moſt rare; the leaves are of a deeper green than the former, and have a gloſſy ſhining appearance.

The leaves of all the three varieties are long, deeply keel-ſhaped, and thoſe of the 1ſt and 2d are finely indented at the edges.

7. **Montserrat Pine.** This is a pretty good ſized Pine, truly tun-ſhaped, and of a bright copper colour. The fleſh a deep yellow, ſomewhat melting, and abounding with a rich and well-flavoured juice.

The protuberances of this Pine, by growing nearly flat, render the fruit, when well ſwelled, almoſt ſmooth, and forming thereby an elegant appearance. The leaves grow nearly ſimilar to thoſe of the Sugar-Loaf Pine, are keel-ſhaped, of a gloſſy dark green, tinged with a deep purple or browniſh colour, and very finely indented at the edges.—There is a ſingularity in this Pine which enhances its value, (viz.) in the autumnal months, and even during winter, it produces a fruit much more ſwelled, and more perfect, than that of the other ſorts, and is not liable to ſuffer by decay or imperfection, either in the fruit or the ſtalk, as is uſual with thoſe of the other ſorts, in a ſeaſon when the ſun's power is not great.

8. Black Jamaica Pine. This is a large pyramidical fruit; it is at firſt black, but as it approaches maturity, becomes of a browniſh yellow colour. The fleſh is a pale yellow, compact and ſomewhat hard, but is leſs ſucculent and leſs excellent than ſome of the former. The

leaves are long, like thoſe of the Black Antigua, are of a dark green, tinged with purple, and are leſs keel-ſhaped than thoſe of moſt other ſorts.—This Pine has been much ſought after, and is ſtill held in great eſtimation by many.

9. Havannah Pine. This forms a low ſhort fruit, ſomewhat tun-ſhaped; at firſt it is of a dark green, but when ripe becomes of a pale lemon-colour. The protuberances of this Pine generally ſwell very large. The fleſh, which is nearly white, is ſoft, melting, and abounding with a very tart or acid juice, for which it is by ſome greatly admired; although by many it is conſidered as too tart.—Sugar is conſtantly uſed with this fruit.

10. Ripley Pine. This is a very large fruit, and elegantly formed. At firſt

it is of a dark purple or blackiſh colour, but as it becomes ripe changes to yellow. The fleſh is of a pale yellow, is ſomewhat hard, and leſs ſucculent than ſome of the others. It has long leaves, which are of a dark green, tinged with a deep chocolate colour. The edges of the leaves are very cloſely and deeply indented.——Some years ago I received a Pine-Plant by the name of the MOCHO PINE, which having fruited here, and appearing ſimilar to the foregoing both in the plant and the fruit, I cannot take upon me to affirm that it is a diſtinct ſpecies.

And here I muſt beg leave to remark, that although ſome of the foregoing Pines are ſo nearly ſimilar as hardly to admit of a deſcriptive difference, ſtill, to a perſon well verſed in Pines, there are indeſcribable appearances in the face of the fruit or its quality, the leaves, the form of the plant, or manner of its growing, that ſtamp a real and viſible difference in the various ſpecies.

11. The KING PINE. This has graſs-green, ſmooth leaves, and produces a pretty large fruit; but as its fleſh is hard, ſtringy, and ſometimes not well flavoured, it is ſo little eſteemed, that few Hot-houſes admit more than two or three plants of this kind.

12. The SILVER-STRIPED PINE, from Surinam. This exceeds, in beauty, the whole tribe of variegated plants. Its leaves are variouſly ſtriped with a dark green, and delicate white; and the whole is tinged with a lively red, which produces a contraſt, that gives the plant a gay, and moſt beautiful appearance.

Nor is there leſs beauty in its fruit, the protuberances of which ſwell large, and, when near ripe, are variouſly marbled with red, green, yellow, and white; which, together with the variegated crown on the top of the fruit, add a ſingularity and elegance to the whole beyond the power of deſcription.

13. The GOLD-STRIPED PINE. This produces a large and elegantly formed fruit, and is at the firſt beautifully marbled with red, green, and white, which gives it a gay and lively appearance even in its infant ſtate. On the approach of maturity it becomes of a deep yellow.

The fleſh is compact, of a gold colour, abounding with a rich and well-flavoured juice.

The leaves are edged with broad ſtripes of a greeniſh yellow colour; are leſs diverſified and leſs beautiful than the SILVER-STRIPED PINE: But on account of its producing a large and excellent fruit, it has been much ſought after by the curious.

14. STRIPED QUEEN PINE. This is an accidental variety obtained from the QUEEN PINE at WELBECK about twenty years ago. It is nothing different from the common QUEEN PINE, excepting in the ſingularity of its leaves, which are beautifully variegated with green, purple, and white. In ſummer the whole plant is ſtrongly tinged with a fiery red, which gives it a gay and moſt beautiful appearance.

There are two or three other varieties of variegated Pines, but leſs deſerving of notice than the former. Likewiſe a more extenſive variety in common cultivation; but I judged it expedient to deſcribe no other than the ſorts now growing in Welbeck garden, and of which I had taſted the fruit myſelf.

There are Pines which go by the names of the Barbadoes, Tobago, Dominica, and all the reſt of the Weſt India Iſlands. Theſe are frequently one and the ſame kind; and ſo long as we call them by the names of the places from whence they come, we ſhall ever be liable to confuſion.—The Duke of Portland has frequently received Pine Plants from different and remote parts of the Weſt Indies; in no one characteriſtic of which I could perceive the leaſt diſtinction.

I have heard it aſſerted that there are Pines with *green*, and have been aſſured that there are others with *red* fleſh; but I muſt confeſs that I have never ſeen one of either, that, to my apprehenſion, could properly be ſo diſtinguiſhed. The fruit of the Queen Pine is often cut when green, (juſt on the point of changing yellow) and in the hot months this method is judicious; but I cannot think that this entitles the kind to be called the Green Pine.

In the year 1771, I brought a Pine plant from Holland, by the name of the Red-fleſhed Pine. The Gentleman in whoſe poſſeſſion it was, aſſured me that its fruit cut as red as any kind of Peach at the ſtone, or as the root of red beet. It fruited in the garden at Welbeck in 1774, but the fruit was very ſmall, cut hard and ſtringy, and was not in the leaſt red. I therefore ſuppoſe that the Gentleman who gave it me had never ſeen the fruit himſelf.

After all, however, I by no means take upon me to deny the above aſſertions; for though I have never ſeen any proof of them myſelf, conſidering the ſimilar inſtances of both in other kinds of fruit, viz. the former in the Melon, and the latter in the Peach, Apple, and Pear, it would ill become me abſolutely to refuſe to give them credit.

On the different Ways of propagating the Pine Apple.

THE Pine is propagated ſometimes by ſeed, but generally by crowns and ſuckers. The ſeeds are produced in the inſide of the protuberances of the fruit, are ſmall, of a dark colour, and in ſhape not unlike the ſeed or kernels of the Apple or Pear.

The crowns are produced on the top of the fruit, of which there is ſeldom more than one; but there are inſtances of two or more being joined together.

The ſuckers are produced in various parts of the plant, but moſt generally from between the leaves near the middle of its ſtem; and the ſuckers produced in that part are eſteemed the beſt. The Brown Antigua, the King, and the Sugar-loaf kinds, commonly produce ſuckers at the top of the ſtem immediately under the fruit; but theſe are generally ſmall, (by Gardeners uſually called gills) and therefore of much leſs value than the former. Suckers too will ſometimes ariſe from the bottom of the ſtem at the root of the plant; and in that ſituation they are generally well rooted when grown to a proper ſize to be taken off.

Suckers are preferable to crowns, being generally of a much larger ſize; the goodneſs of either does not at all depend on the length of their leaves, but on the ſubſtance of their ſtems at the bottom. I have ſometimes had crowns that meaſured, at their bottoms, more than nine inches in circumference, and in ſuch a caſe they are equal almoſt to any ſuckers.

Crowns which grow upon late autumnal fruit, are commonly larger than thoſe produced earlier in the ſeaſon.

On raiſing the Pine from Seed.

I Believe that there have been but few inſtances of the Pine Apple perfecting its ſeed in this country. And I have been informed that the ſeeds are ſo ſcarce in the Weſt Indies, that there is ſeldom more than one found even in thirty or forty fruit.

When the ſeeds of the pine are ſent into this country, it will be adviſable to keep them in a warm room till the latter end of March, or beginning of April. At that ſeaſon the ſeed will be more likely to vegetate than if ſown earlier in the year.

Pots ſhould be prepared, and filled with very fine rich mould within one inch of the top, and plunged in a warm part of the tan-bed, a day or two before the ſeed is ſown, that the mould may become warm. The ſeeds ſhould be ſown one inch apart, and covered about a quarter of an inch with the ſame mould as that in the pots. Then the pots ſhould be immediately covered with a piece of glaſs, which ſhould fit the tops very cloſe; this, by preventing the mould from drying, and giving an additional heat to it near the ſurface, will ſoon cauſe the ſeeds to vegetate. Neither air nor water will be required till the plants begin to appear, when a little air ſhould be given in the day-time only; let the plants be ſprinkled over with water every four or five days, in caſe the weather is fine and clear, but ſhould it prove dark and moiſt, once in ten days will be ſufficient. As the plants advance in ſize, a greater quantity of air ſhould be given them in proportion to their progreſs, and by the time they have ſix or eight leaves, they will have ſtrength to withſtand the general air of the Hot-houſe; and from that time will require a little water twice a week.

The firſt leaves of ſeedling Pines are very ſmall and tender, much reſembling the ſmalleſt blades of graſs, the plants therefore ſhould by no means be left uncovered till they have acquired ſtrength, as the Oniſci or Wood-lice (with which moſt Hot-houſes abound) would in one night deſtroy the hopes of the crop. It will alſo be adviſable, when the glaſſes are firſt taken off the pots, to ſprinkle the plants with water, and immediately duſt them with a little ſnuff or tobacco duſt, which being put into a puff, or ſmall piece of gauze, may be thrown upon them with great eaſe; a very ſmall quantity will prevent thoſe inſects from injuring the plants. This method will alſo ſecure other young and tender plants, kept in Hot-houſes, from the like accident.

By the end of Auguſt the ſeedling Pines will be grown to a proper ſize for tranſplanting, when they ſhould be put into ſmall pots, filled with the ſame mould recommended for crowns and ſuckers; and from that time their treatment requires no difference from that of the others.

On raiſing the Pine by Crowns.

THE crown is perfected at the time when the Pine Apple becomes quite yellow; therefore the crowns of ſuch fruit may be planted as ſoon as taken off: But if the fruit be cut green, as is practiſed by ſome perſons with the Queen Pine, or if only the top of the fruit be green when cut, as is the caſe frequently with the ſugar-loaf kinds, (even when the principal part of the fruit is thoroughly ripened) then it will be neceſſary to let the crowns of ſuch fruit lie a few days after they are taken off, in a ſhady part of the Hot-houſe, in order to give them that degree of maturity to which nature was not allowed to conduct them.

Where there is convenience in the Hot-houſe, or if a hot-bed be in readineſs, the crowns, after having lain a few days on the flues, may be planted in ſmall pots filled with earth, and treated in the ſame manner as will hereafter be recommended for the ſuckers.

As the crowns are taken off daily during the Pine ſeaſon, the quantity of them at one time is never ſo conſiderable as to make it worth while to be continually preparing hot-beds for them. But that no time may be loſt, the moſt adviſable method is to plant them for ſome time in the tan-bed, where there are always vacant ſpaces between the large plants in the fruiting pit, and there the crowns will be preparing their roots againſt the time of their potting.

But before the crowns are planted, their lower or bottom leaves ſhould be ſhortened with the knife or ſciſſors, as it will cauſe them, when planted, to decay much ſooner, and make room for the roots to be produced with the greater eaſe.

I by no means adviſe that the crowns ſtand a long time in this ſituation, for if their roots are permitted to grow to a great length in the tan, (as is practiſed by ſome) they will inevitably receive a check at the time they are ſhifted into the pots, which may be prevented by potting them as ſoon as they begin to ſtrike, or at leaſt by the time their roots are grown to the length of one or two inches; but this cannot be aſcertained ſo well by time as by obſervation, much depending on the temperature of the tan as well as the ſeaſon. When the weather is warm and the tan heats kindly, they will make a greater progreſs in ten or twelve days, than in a month when the tan is in a declining ſtate, and the ſeaſon cold and dark.

The crowns will require very little water during the time they remain in the tan; a gentle ſprinkling or two will be quite ſufficient.

When the crowns are removed from the tan, they ſhould be taken up with great care, and cleared of all decayed matter at their bottoms, and immediately planted in ſmall pots filled with the compoſt mould hereafter recommended, and from that time treated as the ſuckers, in the following manner.

On raiſing the Pine by Suckers.

AS the fruit of the Pine Apple is the principal object, and ſole reward of the great expence and trouble attending its management, few perſons chuſe to permit the ſuckers to remain on the plants till they grow very large, as they would injure the fruit and prevent its ſwelling; they are therefore generally taken from the plants as ſoon as it can be done with ſafety. But where a ſtock of plants is the object, the advantage which might be gained in the fruit is given up, in order to promote the growth of the ſuckers, by permitting them to remain on the old ſtools ſome time after the fruit is cut. In this ſituation the ſuckers will grow very large, provided the ſtools are plentifully ſupplied with water: And if ſome of the moſt forward and ſtrongeſt ſuckers are permitted to remain on the old ſtocks (only one on a ſtool) they will ſometimes produce tolerably good fruit the next ſeaſon. When this is intended, if the ſucker grow near the bottom of the ſtool, a few of the leaves immediately under it ſhould be cut off, and mould raiſed to the bottom of the ſucker (which may eaſily be done by the help of a piece of a broken pot) in order for the ſucker to ſtrike; after which time it will grow amazingly faſt, by receiving nouriſhment from its own roots, as well as from thoſe of the parent ſtock; therefore, as it advances in ſize, the leaves of the old ſtool ſhould from time to time be taken off, in order to make room for it.

Having thus pointed out the different modes that are practiſed, I return to the former, as being the moſt eligible.

Suckers cannot with ſafety be taken from the plants, till they are grown to the length of twelve or fourteen inches, when their bottoms will be hard, woody, and full of ſmall round knobs, which are the rudiments of the roots. It would endanger their breaking if they were to be taken off ſooner.

When the ſuckers are taken off, the operation ſhould be performed with great care, that neither plant nor ſucker may be injured. To prevent which, one hand ſhould be placed at the bottom of the plant to keep it ſteady; the other as near to the bottom of the ſucker as conveniently can; after which, the ſucker ſhould be moved two or three times backwards and forwards in a ſideway direction, and it will fall off with its bottom intire. Whereas, when a ſucker is bent downwards immediately from the plant, it frequently either breaks off in the ſtem, or ſplits at the bottom.

Before the ſuckers are taken off, pots ſhould be provided for them filled with the compoſt mould which will be recommended under that article. Where there are Succeſſion or Breeding Stoves, there is generally ſome part of the tan-bed aſſigned for their reception, which ſhould be renewed with a little freſh tan on the occaſion, and this ſhould lie a few days till the heat begins to ariſe, before the pots are plunged into it.

Sometimes Hot-beds are made for the ſuckers. When that is the caſe, they ſhould be prepared at leaſt fourteen days before the ſuckers are taken off, in order that the violence of the heat may be over: After the bed has been made ten days, it ſhould be levelled, and covered eight or ten inches with tan; and after this has lain four or five days, in caſe the heat of the bed ſhould not be violent, the pots may be plunged into it.

Whichever of the above methods is purſued, it will be proper to beſtow great attention to the temperature of the bed afterwards; and in caſe its heat increaſes the pots ſhould be raiſed.

The ſize of the pots comes now to be conſidered: The general method hitherto uſed to deſcribe the different ſizes of the pots for Pines has been by their prices; as penny pots, two-penny pots, &c. but as I have found that pots of the ſame ſize differ very conſiderably in their prices in different parts of the kingdom, it appears to me ſo indeciſive and diſſatisfactory, that I ſhall ſubjoin a ſcale containing the dimenſions beſt adapted to the ſeveral uſes.

		Inches diameter at the top	Inches deep
1.	Pots for full-ſized crowns and ſuckers	6	5½
2.	—- for plants to fruit the following ſeaſon when ſhifted in March	8½	7
3.	—- for fruiting plants	11½	10

I wiſh it to be underſtood that the above dimenſions are only uſed for full-ſized plants at their different periods:

Plants below the ſtandard muſt have leſs-ſized pots in proportion.

After the ſuckers are taken off, their bottoms ſhould be cut ſmooth, as ſome of them will ſplit a little, and be ragged. Such of them as are hard, woody, and have their knobs (or rudiments of the roots) turgid, may be planted immediately: Others that appear ſoft, and not ſo mature, ſhould lie a few days in the Hot-houſe to harden, and be better prepared for vegetation. Crowns and ſuckers do not ſuffer, like any other plant, by this operation, as ſome perſons imagine. A large ſucker will vegetate after having lain ſix of the hotteſt months in the year expoſed to the ſun in the Hot-houſe. Whereas, almoſt any other plant of the ſame ſize and ſubſtance would in that ſituation loſe its vegetative powers in leſs than a tenth part of that time.

When the ſuckers are put into the pots, it is not neceſſary for them to ſtand deeper in the mould than juſt to keep them faſt; in this ſituation they may remain ten or twelve days, by which time, if the bed heats moderately, they will begin to ſtrike, when they ſhould be gently watered over their leaves; and after the plants are well rooted they may be watered twice a-week from that time to the end of September, provided the weather is fine. But it muſt always be remembered that the Pine plant requires much leſs water in a moiſt than in a dry ſeaſon, as the humidity of the air in a great meaſure anſwers the purpoſe of watering.

When the weather is warm a great deal of air ſhould be admitted, and care ſhould be taken to keep the pots in a conſtant and regular heat, by adding a little freſh tan whenever the heat of the bed begins to decline.

In September the plants ſhould be carefully looked over, and all the forward crowns and ſuckers that are grown large, and with an appearance of being *under-potted*, ſhould be removed into larger-ſized pots with their roots and balls intire. From this time (beginning of September) the plants ſhould be watered only once a week till November, in caſe the weather proves fine; but ſhould it be dark and cold, once a fortnight will be quite ſufficient, eſpecially towards the latter part of that time. After this the Hot-houſe ſhould be kept in a cold ſtate*, and little or no water given the plants till the middle or latter end of January, as the weather may prove more or leſs favourable; for as there is always a moiſture in the tan, in which the Pine pots are plunged, and, as the pots are porous, the roots of the Pine generally imbibe a ſufficient quantity to ſupport the plants during the above ſeaſon, when they are nearly in a ſtate of inaction: However, in ſome ſeaſons, a gentle watering or two may be given, eſpecially when

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[*] In a morning the ſpirits of the Thermometer ſhould not be higher than one or two degrees below the point marked *temperate.* The Author makes Thermometers for ſale on an elegant conſtruction, graduated to a ſcale intirely adapted for the culture of the Pine Apple plant.—But, in order to give his readers a juſt idea of the *meaſure* of a *degree*, referred to in this work, he thinks it will be proper to inform them, that the ſpace between *temperate* and *freezing point* is divided into ten equal diviſions, which ſerve for a ſcale of degrees. However, for the further ſatisfaction of the curious, a ſecond ſcale of degrees is alſo given on the Plate, correſponding with that of Fahrenheit's, as being more generally known.

when there is a *kind* bottom heat, which, during the above time, will be abſolutely neceſſary.

But it ſometimes happens in a long-continued froſt, that it is found difficult to keep the tan in that deſirable ſtate; for it is rather inconvenient to renew the tan-bed in ſuch a ſeaſon, when freſh *cold* tan would be liable to ſtarve the houſe. In ſuch a caſe, the moſt adviſable method is to plunge the Pine pots ſo deep in the tan that their rims may be covered two or three inches; the roots of the Pine plants will thereby receive a greater degree of warmth, and it will alſo prevent the ſurface of the mould in the pots from becoming too dry.

There is nothing ſo prejudicial to the Pine Apple plant, (inſects and an over-heat of the tan excepted) as forcing them to grow by making large fires, and keeping the Hot-houſe warm at an improper ſeaſon, which is injudiciouſly done in many Hot-houſes. It is inconſiſtent with reaſon, and againſt nature, to force a tropical plant in this climate in a cold dark ſeaſon, ſuch as generally happens here in the months of November and December; and plants ſo treated will in time ſhew the injury done them; if large plants for fruiting, they generally ſhew very ſmall fruit-buds with weak ſtems; and, if ſmall plants, they ſeldom make much progreſs in the beginning of the next ſummer.

As the length of the days, and power of the ſun increaſes, the plants will begin to grow, and from that time it will be abſolutely neceſſary to keep them in a regular growing ſtate; for if young plants receive a check afterwards, it generally cauſes many of them to go into fruit. From the time they begin to grow they will demand a little water: Once in a week or ten days, as the weather may prove more or leſs favourable, will be ſufficient till the middle of March, which is the moſt eligible ſeaſon to ſhift them in their pots. If that work is done ſooner, it will prevent the plants from ſtriking freely; and if deferred longer, it will check them in their ſummer's growth.

In this ſhifting I always ſhake off the whole of the ball of earth, and cut off all the roots that are of a black colour, carefully preſerving ſuch only as are white and ſtrong. I then put ſuch plants as are intended to fruit the next ſeaſon into ſecond-ſized pots with freſh mould intire.

The bed at this time ſhould be renewed with a little freſh tan, in order to promote its heating, and the pots plunged therein immediately. The Hot-houſe ſhould be kept pretty warm till the heat of the tan begins to ariſe, as it will be the means of cauſing the plants to ſtrike both ſooner and ſtronger. As ſoon as the heat of the bed begins to ariſe it will be proper to give the plants a ſprinkling of water over their leaves; and as ſoon as they are perceived to grow, they will require a little water once a week for a ſhort time, and afterwards twice a week till the next time of ſhifting them in their pots.

During the ſummer months give the plants plenty of air whenever the weather is warm, and water properly, as has been deſcribed: Let the pots be kept in a regular conſtant heat, and clean from weeds; but above all, avoid an over-heat of the tan. Some perſons plunge a Thermometer in the tan, with the ball of its tube as deep as the bottom of the Pine pots; and by repeated obſervations, a point is fixed for the ſpirits in the part of the tube above the ſurface of the tan, to ſhew when the pots ſhould be raiſed. Whether the above, or the putting *watch-ſticks* in the tan (which is the moſt common method) is practiſed, too much attention cannot be had whenever there is the appearance of too violent a heat in the tan.

If the above directions are ſtrictly attended to, the plants will be grown to a large ſize by the beginning of Auguſt; when they ſhould be ſhifted into the largeſt-ſized fruiting pots, with their roots and balls intire.

But it will be proper here to obſerve, that in ſome Hot-houſes it is found difficult to get plants of the Antigua and Sugar-loaf kinds to fruit at a proper age: And in that caſe, I adviſe the ſhaving off the roots on the outſide, and reducing the balls of *them* at this ſhifting. A greater proportion of ſand ſhould alſo be added to the compoſt, which will be the means of bringing them into a fruiting ſtate at a proper ſeaſon.

The diſproportion of the ſecond-ſized and fruiting pots is ſo great, as to admit of a good quantity of freſh mould at this ſhifting, which is abſolutely neceſſary to ſupport the plants till their fruit becomes ripe: It alſo affords an opportunity of performing the operation of ſhifting the plants without injuring their roots. As there will be a large ſpace between the ball and the ſide of the pot, the mould may be put round the ball with great eaſe. Whereas, when plants are ſhifted into pots, only a ſmall ſize larger than thoſe from whence they were taken, they are generally much injured by the operation of ſhifting: Beſides, even with the greateſt care, there will frequently be ſpaces left hollow between the ball and the ſide of the pot.

A little freſh tan ſhould be added, and the bed forked up, but not to the bottom of the pit, as the tan is liable to heat violently at this ſeaſon of the year; of which when there is the leaſt appearance the pots ſhould be raiſed immediately. The delay of doing it one day may be attended with very bad conſequences.

The plants will continue to grow very faſt this and the following month, and ſhould therefore be watered pretty plentifully, at leaſt twice a week: And in the ſummer waterings it ſhould be obſerved, that it will be of great ſervice to the plants to be watered once a fortnight all over their leaves. If the month of October be wet and cold, the plants ſhould not be watered above twice in that month; but if fine and clear, once a week: And here ends the watering of the fruiting plants for the ſeaſon. I never give them any water in the months of November and December; and during that time I keep the Hot-houſe in a cold ſtate, but a bottom heat is always required; therefore the tan ſhould have been renewed, and the old part of it ſcreened about the end of October or beginning of November; from which time the bed will generally retain a moderate warmth till the beginning of January, when the tan ſhould again be renewed. From that time the Hot-houſe ſhould be kept a few degrees warmer, and as ſoon as the tan begins to ferment, the plants may have a little water given them.

In this month (January*) ſome of the plants will appear ſet for fruiting, which may be diſtinguiſhed by the ſhort leaves in their centres; and from that time they ſhould be moderately watered, (till the middle of March) and the Hot-houſe ſhould be kept pretty warm; a little air ſhould however be admitted whenever the weather will permit.

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* In ſome Hot-houſes, and in ſome ſeaſons, the plants will form themſelves for fruiting in December; and when that is the caſe, the houſe ſhould from that time be kept a few degrees warmer, viz. the ſpirits in the Thermometer ſhould be kept up to the point marked *temperate*, or, in general, one or two degrees higher: For when plants are kept *too cold* at that critical ſeaſon, (viz. the time of forming their fruit) it generally cauſes many of them to ſhew crooked, imperfect, and miſ-ſhapen fruit.

About the middle of March it will be proper to renew the tan-bed, and at the ſame time the plants ſhould be diveſted of a few of their bottom leaves; the mould on the top of the pots ſhould be taken off as deep as can be done without injuring the roots, and the pots filled up with freſh compoſt earth, which will add to the vigour of the plants, as well as give a neatneſs to the whole when finiſhed.

It is very injurious to the plants, and greatly retards the ſwelling of the fruit, to remove them after this ſeaſon; therefore, in caſe the heat of the bed ſhould decline, a freſh heat may be got without moving the plants, by taking out the tan betwixt the pots as deep as poſſible, and filling that ſpace up with freſh tan.—This method is practiſed by ſome even at an earlier ſeaſon.

The plants at this ſeaſon will demand a kind lively bottom heat; and whenever the weather will permit, a great quantity of air ſhould be admitted into the Hot-houſe, the want of a due proportion of which would cauſe the ſtems of the fruit to draw themſelves weak, and grow tall, after which the fruit never ſwells kindly.

As the fruit and ſuckers begin to advance in ſize the plants will require plenty of water to ſupport them, which may be given them at leaſt twice, and ſometimes three times a week, but too much ſhould not be given them at one time; it is better to give them leſs at a time and oftener.

Sticks ſhould be provided to ſupport the fruit before it is grown too large; and in tying them care ſhould be taken to leave bandage-room ſufficient, making allowance for the ſwelling of the fruit.

When the ſuckers are grown to about one foot in length, they ſhould be taken off in the ſame manner that has been deſcribed, and from that time the fruit will ſwell very faſt. As ſoon as the fruit appears full ſwelled, the watering ſuch plants as produce them ſhould ceaſe: But it is too general a practice (in order to have the fruit as large as can be got) to continue the watering too long, which cauſes the fruit to be filled with an inſipid, watery, and ill-flavoured juice.

It is eaſy to know when the Pine becomes ripe by its yellow colour, yet they do not all change in the ſame manner, but moſt generally begin at the lower part of the fruit; ſuch fruit ſhould not be cut till the upper part alſo begins to change, which ſometimes will be many days after, eſpecially in the ſugar-loaf kinds. Sometimes the fruit will firſt begin to change in the middle, which is a certain indication of its being ripe; ſuch fruit ſhould be cut immediately.

Having thus laid down the culture of the Pine Apple plant, whether raiſed from ſeed, by crowns, or ſuckers, to its final perfection in the fruit, I ſhall now ſubjoin ſome hints and obſervations, moſt of which, I hope, will be of uſe.

In treating of the culture of the Pine Apple plant, ſome perſons have recommended the ſhifting of the plants from firſt to laſt with their balls intire; alſo the ſhifting of them oftener than I have here recommended. Theſe methods I diſapprove for the following reaſons:

Firſt, It is obſervable that the Pine plant begins to make its roots at the very bottom of the ſtem, and as the plant increaſes in ſize, freſh roots are produced from the ſtem, ſtill higher and higher; and the bottom roots die in proportion: So that, if a plant in the greateſt vigour be turned out of its pot as ſoon as the fruit is cut, there will be found at the bottom a part of the ſtem, ſeveral inches in length, naked, deſtitute of roots, and ſmooth: Now, according to the above method, the whole of the roots which the plant produces being permitted to remain on the ſtem to the laſt, the old roots decay and turn mouldy, to the great detriment of thoſe afterwards produced.

Secondly, The firſt ball which remains with the plant full two years, by length of time, will become hard, cloddy, and exhauſted of its nouriſhment, and muſt therefore prevent the roots afterwards produced from growing with that freedom, and vigour, which they would do in freſher and better mould.

Thirdly, The old ball continually remaining after the frequent ſhiftings, it will be too large when put into the fruiting pot, to admit of a ſufficient quantity of freſh mould to ſupport the plant till its fruit becomes ripe, which is generally a whole year from the laſt time of ſhifting.

It is an object of emulation amongſt Gardeners to try to excel their neighbours in the ſize of their Pines. In order to produce very large fruit, I recommend the following method, which I have often practiſed with great ſucceſs.

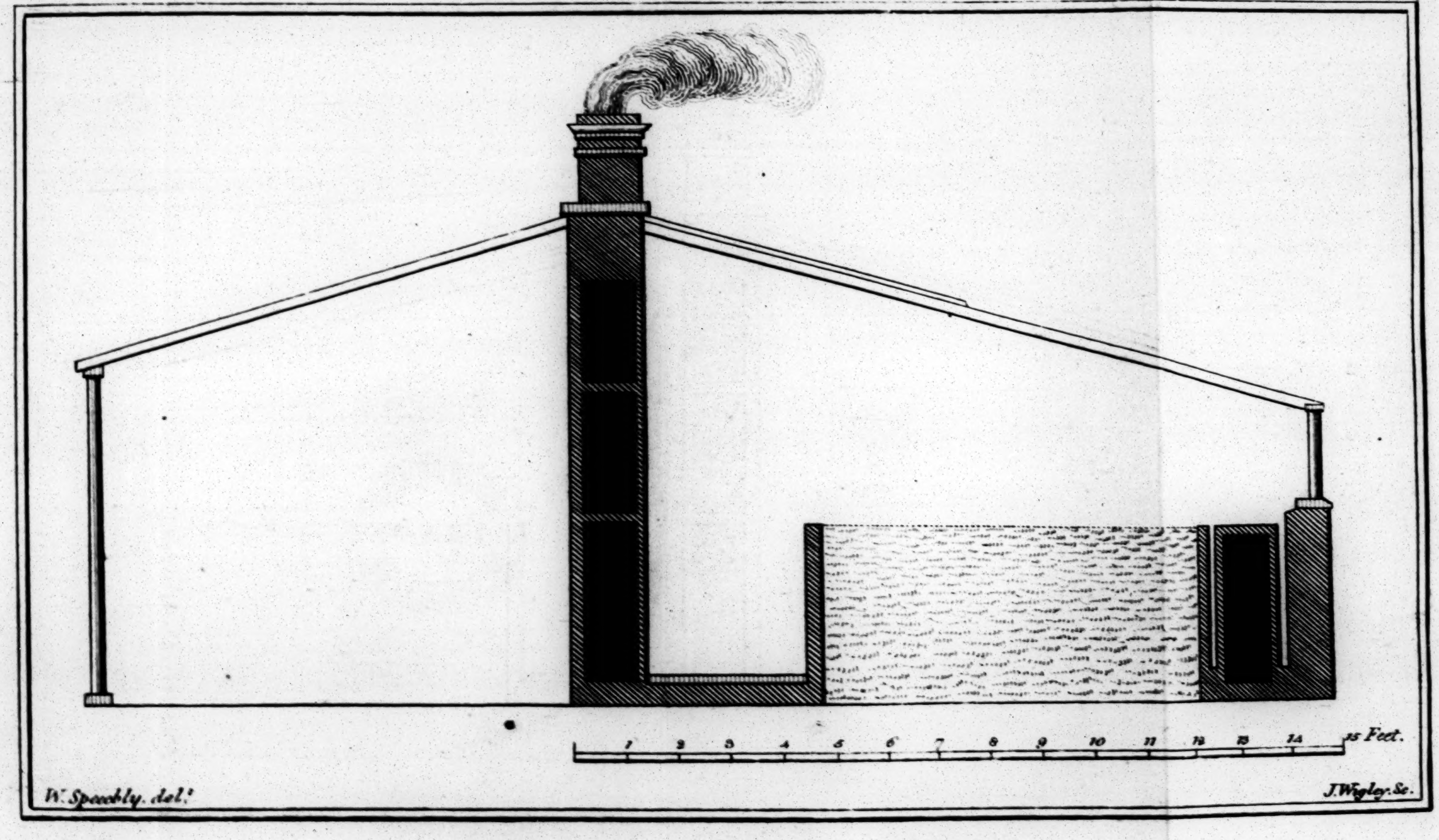
In the month of April or May, it is eaſy to diſtinguiſh, in a ſtove of Pines, which plants promiſe to produce the beſt fruit; this is not always the caſe with the largeſt. A few of the moſt promiſing being marked, a ſmall iron rod, made with a ſharp angular point, may be thruſt down the centre of the ſucker, which being turned two or three times round will drill out the centre and prevent its growing; this muſt be performed on all the ſuckers as faſt as they appear. Thus the plant being plentifully ſupplied with water, and having nothing to ſupport but the fruit, will ſometimes grow amazingly large: But this method ſhould not be practiſed on too many plants, as it is attended with the intire loſs of all the ſuckers.

A yet further advantange may be given to the ſwelling of the fruit, by having a few of the lower leaves of the plant taken off, and by putting a rim of tin, or any thing elſe in the form of a hoop, round the top of the pot, ſufficient to raiſe the mould three or four inches.

The mould ſhould be of the beſt quality, and conſtantly kept in a moderate moiſt ſtate: This may be done by having the ſurface kept covered with moiſtened moſs. The roots of the Pine plant, eſpecially thoſe produced from the part of the ſtem juſt under the leaves, will then make a ſurpriſing progreſs, and the fruit will be greatly benefited by this expedient.

Here it may be neceſſary to obſerve that both the growth and ſize of Pines depend much on the conſtruction and condition of the ſtove in which they are cultivated. In many places ſmall ſtoves of a particular conſtruction (in the which the Pines ſtand very near the glaſs) are erected ſolely for the purpoſe of FRUITING-HOUSES. Theſe, from their being always kept up to a high degree of heat, are by Gardeners uſually termed ROASTERS.--*See Plate* 1.—When there is ſuch conveniency, it is cuſtomary, when any Pine plants ſhow fruit in the large ſtoves, to remove ſuch plants (eſpecially the moſt promiſing) directly into the Fruiting-Houſe; where, from the high degree of heat kept, they generally ſwell their fruit aſtoniſhingly.

It is obſervable that Pines always ſucceed beſt in ſtoves that have been newly erected; on which account ſome of the more curious in the cultivation of this fruit have judged it expedient to pull down and rebuild their Pine-ſtoves every ten or twelve years. Although I cannot ſubſcribe to ſuch expenſive mode of procedure, Section of a Fruiting House. Plate 1. p. 58.



W. Speechly. delt.

J. Wigley Sc.

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cedure, I ſhall here beg to ſtate the many advantages that accrue from keeping Pine-ſtoves in good and proper repair.

Firſt, By keeping the flues clean from ſoot, and air-proof, they will heat the houſe better, and much leſs fuel will ſerve.

Secondly, By a due attention to keeping the inſide of the roof, &c. duly painted, and by conſtantly white-waſhing the walls and flues in every part of the houſe, the plants will be greatly benefited, both from having a better reflection and from cleanlineſs.

A further advantage in ſtoves newly built may alſo here be remarked. Where tan only is uſed, the beds are always filled at the firſt with new tan intire; but afterwards conſtantly with new and old tan intermixt.

Laſtly, It is probable that ſtoves, newly erected, derive their greateſt benefit from the good condition of the glaſs work; for, however well it may be kept in repair afterwards, it is certain that there never is ſo much light in an old ſtove as was at the firſt. Dirt will find its way into the cavities between the ſquares, &c. which, obſtructing the ſun's rays, darkens and gives a gloomineſs to the ſtove.

It ſometimes happens that great part of a ſtove of plants will ſhew their fruit at or near the ſame time, and with the ſame treatment, would conſequently become ripe too nearly together. To prevent this, and bring them into a regular ſucceſſion, when the fruit is nearly ripe, part of the plants may be taken out of the ſtove and ſet in a dry ſhady place; as for inſtance, the ſtove-ſhed, where the pots ſhould be covered with moiſtened moſs, but no water given them: It muſt be obſerved, that every one of the plants muſt be taken into the Hot-houſe again, and ſet in the tan-bed for a week or ten days before the fruit is cut, to give it a good flavour. When there is a variety of Hot-houſes this caution is not neceſſary.

Large fruiting plants will ſometimes ſhew their fruit in the months of Auguſt and September, but theſe are generally thought of no value, and conſequently thrown away. To prevent this, I frequently take ſuch plants out of the Hot-houſe as ſoon as their fruit begin to appear. I then ſet them in a ſhed or out-houſe for five or ſix weeks; at the expiration of which time I pot them as in the month of March, after ſhaking off their balls. After this I plunge them into the tan; and in the month of March following put them into larger-ſized pots, with their balls and roots intire. By this means I have ſometimes cut tolerably good fruit from ſuch plants in the months of May and June following. Such forward plants generally produce very fine ſuckers.

Whenever the Pine plants are removed after they are grown large, it will be of ſervice, before they are taken out of the tan-bed, to mark the ſide of the pots which ſtands next the ſun; for it is obſervable, that the centres of the plants generally tend that way: So that the plants, when replaced, may ſtand as they did before they were removed. I do not mean that it is at all neceſſary for the plants to be put into the very identical places in which they ſtood before, but in point of poſition it will be proper, and the plants will be benefited by being ſo placed. This may as eaſily be done as placing them in a random manner, which is the common method.

Beſides the watering of the Pine plants in the manner recommended, it will be of great uſe to them during the ſummer, if the walks and flues of the Hot-houſe be frequently watered: This ſhould conſtantly be done in very warm weather, and always late in the evening; the glaſſes ſhould be immediately cloſed. The great heat of the Hot-houſe will exhale the moiſture and raiſe a kind of artificial dew, which will ſoon ſtand in drops on the glaſſes; the leaves of the Pine being ſucculent, they will imbibe the watery particles to the great benefit of the plants.

It will alſo be of great uſe to give the top of the tan-bed frequent waterings during the ſummer, in order to keep it in a moiſt ſtate; for when the tan becomes dry and huſky, the Pine plants never make any great progreſs. The water may with great eaſe be put upon the tan between the Pine pots, by the help of the watering-pipe. When the tan is in a moiſt ſtate, it not only affords a more generous warmth to the plants, but (the pots being porous) their roots alſo imbibe a conſtant moiſture, which is far preferable to any waterings that can be given them.

Inſects excepted, no greater misfortune can befal a ſtove of Pines than an overheat of the tan; for notwithſtanding all the care a Gardener can beſtow, when this happens, the plants are generally injured in a greater or leſs degree. It uſed to give me much concern, during the time I uſed nothing but tan, that no effectual means could be found to remove ſo great a grievance: But by ſubſtituting Oak-leaves in the place of tan, this miſchief is abſolutely annihilated. I ſhall therefore give my readers the method of uſing them at the end of this work. However, as Oak-leaves are not to be got in ſufficient quantities in all places where there are Hot-houſes, I have, in this treatiſe, conſidered every part, and adapted it as if tan only were uſed: It therefore becomes neceſſary for me to add, that the ſtated times already laid down for renewing the tan, together with the renewal of it as often as it becomes cold, ſhould be carefully and diligently attended to. However, the goodneſs or badneſs of the tan, and the ſeaſon, will ever make thoſe times uncertain.

On Compoſt Mould proper for the Pine Apple Plant.

PROPER compoſt mould for the Pine plant is a very important article, and in the courſe of my practice I have long endeavoured to diſcover in what kind of compoſt it will grow with the greateſt vigour; and after numerous experiments made with mixtures, of cows, deer, ſheep, pigeons, hens, and rotten ſtable-dung, with ſoot, and other manures, in various proportions, with freſh paſture ſoil of different qualities, I can venture to recommend the following:

In the month of April or May, let the ſwarth or turf of a paſture, where the ſoil is a ſtrong rich loam and of a reddiſh colour, be pared off, not more than two inches thick: Let it then be carried to the pens in ſheep paſtures, where ſheep are frequently put for the purpoſe of dreſſing, which places ſhould be cleared of ſtones, &c. and made ſmooth; then let the turf be laid with the graſs ſide downwards, and only one courſe thick; here it may continue two, three, or more months, during which time it ſhould be turned with a ſpade once or twice, according as the pen is more or leſs frequented by the above animals, who, with their urine and dung, will enrich the turf to a great degree, and their feet will reduce it, and prevent any weeds from growing.

After the turf has laid a ſufficient time *, it ſhould be brought to a convenient place, and laid in a heap for at leaſt ſix months, (if a twelvemonth it will be the better) being frequently turned during that time; and after being made pretty fine with a ſpade, but not ſcreened, it will be fit for uſe.

In places where the above mode cannot be adopted, the mixture may be made by putting a quantity of ſheeps dung (or deers dung if it can be got) and turf together. But here it muſt be obſerved, that the dung ſhould be collected from the paſtures when newly fallen; alſo, that a larger proportion ſhould be added, making an allowance for the want of urine.

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* I generally let it lie in the pens till the quantity of ſheeps dung conſtitutes nearly one third part.

1. Three wheelbarrows of the above reduced ſwarth or ſoil; one barrow of vegetable mould from decayed Oak-leaves, (as deſcribed in the end of this work) and half a barrow of coarſe ſand, make a compoſt mould for CROWNS, SUCKERS, and YOUNG PLANTS.

2. Three wheelbarrows of ſwarth reduced as above, two barrows of vegetable mould, one barrow of coarſe ſand, and one fourth of a barrow of ſoot, make a compoſt mould for FRUITING PLANTS.

The above compoſts ſhould be made ſome months before they are wanted, and very frequently turned during that time, that the different mixtures may get well and uniformly incorporated.

It is obſervable, that in Hot-houſes, where Pine plants are put in a light ſoil, the young plants frequently go into fruit the firſt ſeaſon (and are then what Gardeners term *runners)*; on the contrary, where plants are put in a ſtrong rich ſoil, they will continue to grow, and not fruit even at a proper ſeaſon: Therefore, from the nature of the ſoil from whence the ſwarth was taken, the quantity of ſand uſed muſt be proportioned; when the loam is not ſtrong, ſand will be unneceſſary in the compoſt for young plants.

I conceive that the *urine* of ſheep contains a greater quantity of mucilage, or oleaginous matter, than the *dung* of thoſe animals: And this opinion is founded upon obſervations made in ſheep paſtures, where, during the ſummer months, the effects of both are eaſily diſtinguiſhed. I alſo preſume that the reduced ſwarth in the pens receives a very conſiderable degree of fertility from the feet of the ſheep.

Where Oak-leaves are not uſed in Hothouſes, the vegetable mould may be made by laying a quantity of them together, in a heap ſufficiently large to ferment, as ſoon as they fall from the trees: They ſhould be covered for ſome time at firſt to prevent the upper leaves from being blown away. The heap ſhould afterwards be frequently turned, and kept clean from weeds: The leaves will be two years before they are ſufficiently reduced to be fit for uſe.

I ſhall juſt obſerve, that it will be proper to keep the different heaps of compoſt at all times clean from weeds, to turn them frequently, and to round them up in long rainy ſeaſons. If covered, the better; but they ſhould be ſpread abroad in continued froſts and in fine weather.

On a due Proportion of Air proper for the Hot-Houſe.

IT is from a due proportion of air admitted into the Hot-houſe, that the goodneſs of the Pine plants in a great meaſure depends. The want of it will cauſe them to grow with long leaves and weak ſtems, which plants never produce good fruit.

On the other hand, air admitted in too great a quantity, or at improper ſeaſons, will ſtarve the plants, and cauſe them to grow yellow and ſickly.

In the winter months, during the time that the plants are nearly in a ſtate of inaction, the Hot-houſe will require very little air; yet it will be abſolutely neceſſary to take every favourable opportunity to let out the foul air, and dry the houſe: And the letting down the glaſſes a little way, even for a few minutes in the middle of the day, will ſometimes do that buſineſs, eſpecially when there is a little ſun, and ſome wind. At this ſeaſon there is not the leaſt neceſſity to have regard to the words *give air* on the thermometer, for a little air may ſafely be admitted, although the ſpirits ſhould not riſe higher than ſix or eight degrees above the point *temperate*.

But during the ſummer, when the weather is warm and fine, air ſhould be admitted very plentifully. It will cauſe the plants to grow with broad leaves, and their ſtems will be ſtiff and ſtrong, provided proper room be given them in the bed. Such plants generally produce large, well-ſwelled fruit.

In many places it is cuſtomary to ſhut up the Hot-houſe at ſix o'clock in the evening, let the weather be ever ſo warm and fine, that buſineſs being frequently left to the care of labourers, who leave their work in moſt gardens at the above hour. In the months of May, June, and July, the ſun has great power in an evening after the above hour; when, if the houſe has no air, the heat in it will ſoon be raiſed to ſuch a degree as to cauſe the plants to grow tall and weak, and prevent the fruit from ſwelling.

In a hot ſeaſon I frequently let the Hot-houſe have air during the whole night, and ſometimes for many weeks together. But when this is done, the glaſſes ſhould be left in ſuch a manner as to prevent the rain, in caſe any falls, from coming on the plants.

It has been thought adviſable by ſome, to conſtruct Hot-houſes in ſuch a manner as that air might be admitted by the back wall; while others have been of opinion that it acquired a more beneficial temperature by being conveyed through a Green-houſe into the Hot-houſe. To the firſt method I object, upon account of the northern quarter from whence the air immediately comes: And to the laſt, on account of its paſſage through the Green-houſe, which I conceive may affect its purity. I do therefore recommend, in preference to all other contrivances, the admiſſion of air between the glaſſes immediately over the plants.

General Obſervations on watering the Pine Apple Plant.

FROM the ſtated times already laid down for the watering of the Pine Apple plant, a perſon not well ſkilled in its management might be led into an error, in regard to the proper quantity that ought to be given. Therefore it becomes neceſſary for me to ſay ſomething more upon this head.

In the firſt place, I diſapprove of ever giving a great quantity of water *at one time* to the Pine Apple plant, in any ſtage, or at any ſeaſon; if too much is given it will cauſe the mould in the pot to run together, after which, when it becomes dry, it will be hard and cloddy, and therefore not ſo well adapted to encourage the progreſs of the roots of the plant: Beſides, the glutting a plant with water will rob it of its vigour, and if practiſed long will reduce it to a weak ſtate.

The Pine Apple plant is of a ſucculent nature; and altho' it will diſpenſe with a pretty moderate quantity of water in the ſummer, when large and vigorous, yet it does not ſuffer, like moſt other plants, by being kept *too* dry. Young plants, eſpecially in the hot part of ſummer, if kept in a dry ſtate, will not appear to make any progreſs; yet, if there is a bottom-heat, their roots make great advances, and the plants always grow very faſt after being in ſuch a ſtate, whenever water is given them; therefore, though the keeping plants *too* dry is certainly an error, it is not attended with the ſame fatal conſequences as the contrary practice. It is my wiſh, however, to give ſuch directions as may enable a perſon to avoid either extreme.

We are informed, that in ſome of the Weſt India Iſlands, where the Pine Apple plant grows in great perfection, no rain falls in the ſummer for many months together; therefore this plant is ſupplied with moiſture from the dews only, which we are told fall copiouſly. The method I have recommended of watering the walks and flues, &c. of the Hot-houſe in an evening, in order to raiſe a kind of artificial dew, is in imitation of theſe natural waterings. The frequent gentle ſummer-waterings recommended in the foregoing work, are alſo founded on the ſame principle; therefore theory, as well as practice, determines that method to be the moſt eligible.

Plants lately ſhifted into the pots, till their roots get matted, do not require ſo much water as before their ſhifting.

Plants that are in large-ſized pots, in proportion to the ſize of the plants, do not require ſo much water as plants that are under-potted.

Plants that are in hard-burnt pots, made of ſtrong clay, do not require near ſo much water as plants in pots leſs burnt, and made of clay with a good proportion of ſand intermixed. The latter are greatly to be preferred.

Plants in a vigorous growing ſtate require very frequent and gentle waterings.

But plants with fruit and ſuckers upon them, require moſt of all.

When plants are watered over their leaves, it ſhould be ſprinkled upon them only till every part is made wet, which may eaſily be diſtinguiſhed, as the water immediately changes the colour of them to a ſad green. As the leaves ſtand in different directions, the beſt method is to daſh the water upon them backwards and forwards, on every ſide of the bed.

Summer-waterings ſhould always be given late in an evening; but in the ſpring and autumn, the forenoon is the proper time.

Leſs water ſhould be given in moiſt than in dry weather, for reaſons already given.

In winter, when water by accident falls into the centres of the fruiting plants, it ſhould immediately be drawn out, which may eaſily be effected by the help of a tin pipe of about three feet in length, one end of which ſhould be no bigger than the ſmall end of a tobacco-pipe.

On Water proper for the Pine Apple Plant.

THE quality of the water uſed in the Hot-houſe is of conſiderable importance. In many places, Hot-houſes are ſupplied with well-water, which is generally put into a ciſtern three or four days before it is uſed. Pond, or river-water, is preferable, and is generally choſen for the above purpoſe, where it can be had with conveniency; but the ſupply that a Hot-houſe requires is attended with much trouble and great expence.

It muſt be allowed that the water which falls from the heavens is preferable to any other: There is ſomething in rain-water peculiarly adapted to promote vegetation. It ſeems to contain the food of plants, which it gets in its paſſage through an atmoſphere loaded with putreſcent particles.

All Hot-houſes may ſo eaſily be ſupplied with rain-water, that it ſeems ſtrange an object of ſo much importance ſhould hitherto have been ſo little attended to.

The water which falls on the roof of a Hot-houſe is in moſt ſeaſons ſufficient at leaſt for the Pine plants contained in it: I ſay in moſt ſeaſons, for the quantity collected from the dews in dry weather is almoſt incredible: Whether it proceeds from the exhalation ariſing from the frequent waterings in the Hot-houſe, in which caſe the ſame water may poſſibly be uſed ſeveral times over, or whether the great heat in the Hot-houſe attracts the watery particles floating in the open air during the night, are points that I ſhall not take upon me to determine.

When a Hot-houſe is building, by beſtowing a very trifling additional expence, (which will ſave a continual one afterwards) the rain that falls on the roof may be brought into a ciſtern placed in any part of the building.

When this is intended, it will be neceſſary to have a courſe of ſtone project in front nine inches beyond the wood plate that ſupports the roof; which ſtone ſhould have a groove cut in the middle five inches in breadth, and the depth of the groove at the beginning ſhould be half an inch, increaſing one-eighth of an inch in every yard in length. This is a good proportion. The groove will receive the water that falls on the roof, and if worked in the above manner, the water will deſcend to one end of the ſtove if ſmall; but if the Hot-houſe be large, it will be more convenient to deſcend from both ends to the middle, where a ſemi-circular ſtone, one foot in diameter, worked in the form of a baſon, ſhould receive the water: This ſtone muſt have a hole cut at the bottom, into which a leaden pipe ſhould be fixed, which will take the water from thence to any part of the Hot-houſe under the level of the ſtone.

The large Hot-houſe at Welbeck is thus contrived; ſo that all the rain that falls upon its roof, which contains above three thouſand ſquare feet, is brought at pleaſure into a large ciſtern in the front-bed in the middle of the ſtove.

I ſhould have obſerved, that the groove in front is covered with lead; likewiſe, that there is a waſte-pipe in the ciſtern to take off the water when the ciſtern is full; alſo, that a ſmall plug prevents the water from coming into the ciſtern, when not required; and, that the ciſtern is ſufficiently large to contain a reſerve of water againſt dry weather.

On Fire proper for the Hot-houſe.

IT would be ſo difficult to keep the Pine Apple plant in any part of this Iſland, throughout a ſevere winter, without the aſſiſtance of fire, that I believe I do not aſſert too much when I ſay it would be impoſſible: But at the ſame time that fire is abſolutely neceſſary, the moderate uſe of it will be found equally ſo.

Coal is the moſt general fuel uſed in Hot-houſes, although, peat, turf, or wood, will anſwer the purpoſe as well; but fires made with the latter require a great deal more attendance.

In the months of October, November, and great part of December, the Hot-houſe will require very ſmall fires, as I already have obſerved. The advantages of keeping the ſtove in a cool ſtate during that part of the ſeaſon are very apparent. A moderate fire made in an evening will then be quite ſufficient; and when it begins to burn pretty briſk, it will be proper to cover it over with aſhes taken from under the grate, (ſuppoſing the fire made with coal) which will cauſe it to give a moderate heat through the greateſt part of the night, provided the external air be well excluded from the fire-place, which is a point eſſentially neceſſary to be obſerved: And if the morning ſhould be ſevere, no danger need be apprehended if the ſpirits in the Thermometer be up within two or three degrees of the point marked *Temperate*.

In the months of January and February, ſtronger fires will be requiſite, as the Pines then demand a kinder treatment: But I ſhall here obſerve, that then, as well as at all times, be the weather ever ſo ſevere, it will be imprudent to make exceſſive ſtrong fires: Exceſs of fire cracks the flues, and cauſes them ſoon to go out of repair, after which the ſame quantity of fuel will not have the ſame effect; beſides, when once the flue becomes cracked, it will admit the ſmoak into the houſe, to the great detriment of the plants contained in it.

In order to preſerve the flues there ſhould always be a ſufficient number of fire-places, by which means the fires need not at any time be made ſo ſtrong. When the roof of the Hot-houſe is covered, one fire will ſuffice for about ſeven or eight hundred ſquare feet; but where no covering is uſed, it will not give a proper heat to more than five or ſix hundred feet: So that the number of ſquare feet contained in a Hot-houſe being known, the number of fire-places required may be eaſily aſcertained.

Some perſons who give deſigns for the building of Hot-houſes, allow a fire to work a much larger ſpace than I here recommend, in order to make it appear that the expence in fuel will not be ſo great; whereas, in fact, the caſe is quite the reverſe; for I can venture to aſſert, that one fire worked violently, will conſume more fuel than two that are worked moderately; the latter will alſo heat the houſe more regularly, and never be productive of the bad effects which attend the former, as I have already ſhewn.

Hot-houſes that are new built, require much leſs fire than thoſe that are old, and conſequently in worſe repair: In the former there is ſeldom occaſion for the fires to be continued longer than the beginning of May, yet there are ſometimes inſtances of fires being requiſite, even in the ſummer months; not only in reſpect of the weather, but in order to promote the ripening of late-ſhewn fruit.

Fuel is often burnt in ſtoves without effect, by the improper conſtruction of the fire-places:* It is a common thing for

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* Mr. Joſeph Thompſon, Gardener to the Right Hon. Lord John Cavendiſh, at Billing, in Northamptonſhire, has obligingly favoured me with the following important account of a method of burning lime in ſtove fire-places.—It will, I truſt, prove a valuable piece of information, more eſpecially to perſons ſituate in a lime-ſtone or chalk country, and where coal abounds. When lime is of a fattening quality the acquiſition will be ſtill greater, not only by way of contributing to improve the quarters in Kitchen Gardens, but alſo by its being poſſeſſed of powers capable of deſtroying ſnails, ſluggs, &c. with which moſt old Kitchen Garden grounds abound.

" Agreeably to my promiſe I now ſend you herewith an account of our method of burning lime in the ſtove fire-places, together with a Plan of the Kiln ſketched out with a pen, which I have endeavoured to explain by references.

The ſize of the Kiln ſhould vary according to the quantity of lime required, and the heat that may be needful for Pine-ſtoves or Forcing-houſes, &c.—Ours here is ſomewhat larger than the dimenſions given, and by working only at nights and mornings, will burn four buſhels of lime per day. This takes ¾ hundred of coals, which, with us, coſts 1 s. But as Lord John Cavendiſh does a great deal of building here, and as the workmen conſider the lime thus burnt greatly preferable to any we can get, (when we buy our lime it is brought five miles, and coſts 3 s. 6 d. per quarter) I have frequently had occaſion to burn lime in a hot

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EXPLANATION of PLATE II. p. 90.

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a Section of the Lime-kiln or Furnace.

b Ground Plan of ditto.

c Cavity into which the Lime falls when the Kiln is drawn.

d d d d Iron Frame grooved to receive the Grate.

e Grate with an Iron Handle.

f Plate of Caſt-iron to cover the Kiln*.

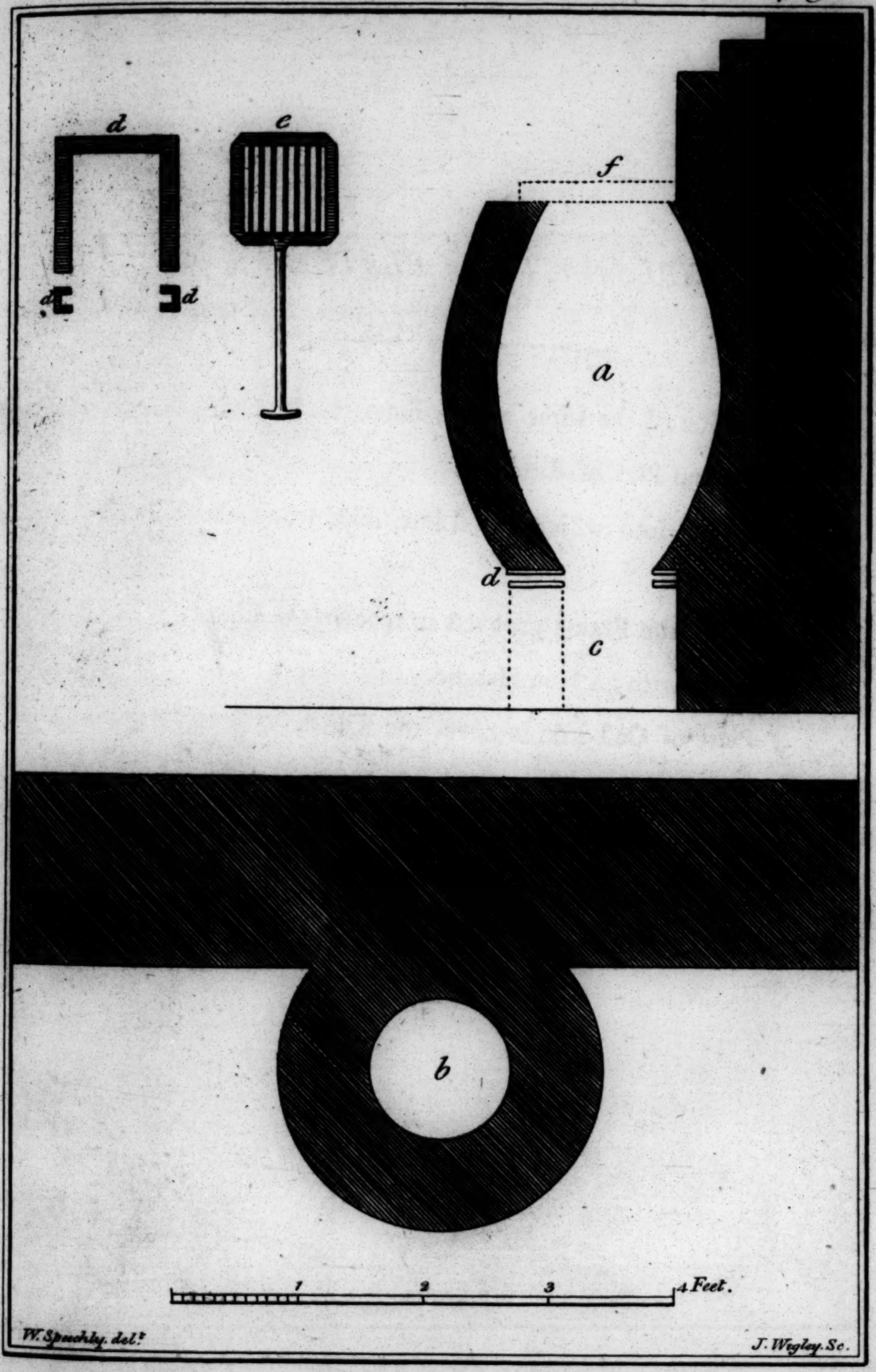
g Flue.

h h h Back Wall of the Stove.

* N. B. An old Caſt-iron Grate, or Chimney Back, ſerves very well for this Purpoſe.

A Lime Kiln.

Plate 11. p. 90.



W. Speechly. del.t

J. Wigley. Sc.

Publishd Aug.t 1st 1795. by Wm. Speechly. as the Act directs.

BRITISH 11 JA 77 MUSEUM

for ſtove-fires to return back when the

hot ſeaſon when fire heat has not been required in our Forcing-houſes.

I have made the following obſervations in regard to the profits attending this mode of practice.

	s.	d.
To digging one load of ſtone, ...	0	3½
To carriage of ditto, ...	1	6
To coals to burn the above, ...	8	8
To a boy 10 days work at breaking the ſtone, attending the fires, and doing other jobbs,	5	0
	15	5½
To 5 quarters of lime worth	17	6
	2	0½

Here is, you will obſerve, a ſmall balance in favour of this mode of practice, excluſive of ten days fire heat in our Forcing-houſe. And this was done when I only worked the Kiln at nights and mornings.—But when we work it all day, by letting the lime out at the ſliding grate, and by adding coal and ſtone at the top, we can then burn a quarter in a day, and the boy can manage to break ſtone and coal, and attend the Kiln, without any other aſſiſtance. Beſides, there is another advantage when we burn all day; for the Kiln, by becoming red hot, limes the ſtone more rapidly, and I judge that ⅕ leſs coals will do in the laſt caſe.

I ſhall beg to obſerve, that we abound in lime-ſtone here; but, in this inland part of the Country, coal is a moſt expenſive article.

I have never heard of any other Kiln of this kind in England. Lord John told me it was practiſed at Lady E. Ponſonby's, at Biſhops Courts in Ireland."

Billing, *Jan.* 1794.

wind is in certain points; but the means of preventing this are very eaſy. Smoak is a fluid, and acts on the ſame principles as water; but their diſproportion of gravity, (conſidered with that of common air) naturally makes their directions tend differently.

We know, that if a pipe filled with water be placed in an exact horizontal poſition, both ends being open, the water will run out gently each way; but if a veſſel filled with water be elevated, and fixed to one end of the pipe, the water will run out at the other end with a rapidity proportioned to the elevation of the veſſel.

The caſe is ſimilar; the flues in Hot-houſes are carried a great length from the fire-place in a horizontal poſition; and when the fire-place (which is frequently the caſe) is too near the level of the flue, the fire will neceſſarily return back when the wind is in certain points. To prevent this, the fire-grate ſhould be placed two feet below the level of the bottom of the flue; and eighteen inches being a proper depth for the fire-place, the top of the fire-place will be ſix inches below the bottom of the flue, which will be ſufficient to give the fire a good draught.—Fire-places conſtructed in this manner I have never known to fail, but have found them draw well at all times, and in all ſeaſons.

On Steaming of the Pine-Stove, &c.

THE method of ſteaming of Pine-ſtoves and Forcing-houſes ſeems to ſtand forward among the modern improvements of gardening.

The powers of ſteam are certainly aſtoniſhingly great, and have been found of wonderful utility in the line of mechanic arts; but it is exceedingly doubtful whether the uſe of ſteam in Pine-ſtoves and Forcing-houſes will be poſſeſſed of ſo many advantages, and turn to ſo good account, as ſome of the more ſanguine among modern projectors have eſtimated.*

The

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* EXTRACT from the GENERAL EVENING POST from November 22d—24th, 1792.

A Gentleman, who is eminently diſtinguiſhed for his mechanical talents, and his improvements in ſeveral branches of rural economies, has lately contrived to rear Pine Apples, Melons, and other Hot-houſe plants, without the uſe of tan, or other fermentative mixture, the neceſſary heat being communicated by ſteam; and after having practiſed it for at leaſt two years, he can now, with ſome degree of confidence, pronounce, that it has even exceeded his higheſt expectations, and is in ſeveral reſpects preferable to any mode hitherto practiſed for any Hot-houſe plants, particularly in reſpect to inſects; for he does not find that any one claſs of inſects has ever ſince attacked any of the plants that have been reared after this new method.

The extravagant idea of ſteam anſwering every purpoſe of both fuel and tan, in

The circumſtances that led him to the diſcovery, was the difficulty of finding tan in his particular ſituation. Chagrin'd at this, he began to reflect if it might not be poſſible to do without it. It readily occurred to him, that heat and moiſture are the two great agents in promoting vegetation, and he thought, if theſe two could be conjoined together, it could not fail to prove ſalutary. Steam, properly managed, ſeemed to promiſe to do this. He then contrived an apparatus, by which water can be kept properly heated to tranſmit ſteam; and this ſteam ſo managed as to be capable of acting either by its heat only, or by its heat and moiſture united, as circumſtances ſhould indicate to be proper, by means of flues, either horizontally diſpoſed under a bed of earth, or in a perpendicular wall; both the ſoil in which the plants grow, or the wall to which they are nailed, can be heated to any degree wanted; and by admitting the ſteam itſelf at pleaſure, either in the body of the mould, or in the Hot-houſe, the plants may be ſubjected to a heated bath, if you pleaſe ſo to call it, which appears, by the experience he has of it, to be wonderfully kind to vegetation. The whole plant comes to be moiſtened with a warm vapour, which wholly condenſes into a dew, that ſeems to penetrate every part of the leaf, and confers an invigorating freſhneſs to the whole plant, that nothing elſe could have effected.—It is impoſſible to conceive any thing more beautiful, luxuriant, and fruitful than the Vines reared by this mode of management.

in regard of heat, I believe on trial proves merely an ideal projection.

A genial warmth and moiſture happily combined generally prove ſalutary to vegetation; but exceſs of ſteam in Hot-houſes has by experience been found prejudicial both to the Pine and the Vine.

Steam in Pine-ſtoves and Forcing-houſes may be found uſeful when uſed with care and judgment. In my own opinion its greateſt uſe will be in counteracting the parching and violent heat we often experience; ſometimes ariſing from the exceſs of heat in the flues, and ſometimes from a powerful ſun-heat and dryneſs of the weather; but oftener by theſe cauſes in conjunction, in a ſeaſon when the nights prove froſty and the days warm and dry.

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EXPLANATION of PLATE III. p. 97.

a The Boiler; this ſhould be about eight inches deep, and made of caſt iron.

b Steam Pipes of lead.

c Dry Flues.

d Walks.

e Perforated Arch under the Pine-pit (or Tan-bed.)

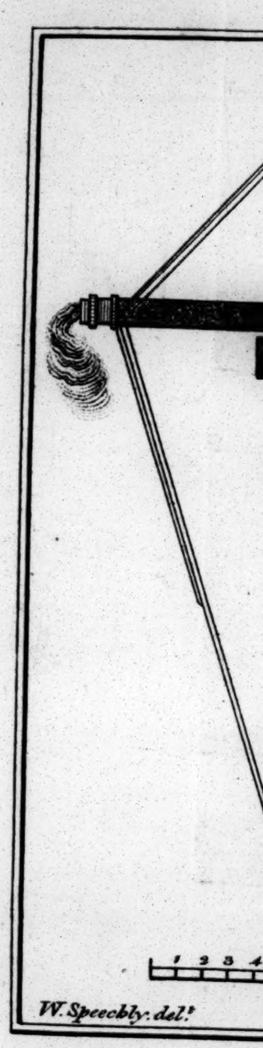
f Stop-cocks, or Plugs, to admit the ſteam into the Houſe when wanted.

g Dampers to turn the ſteam either under the pit, or into the pipes.

h Cavities.

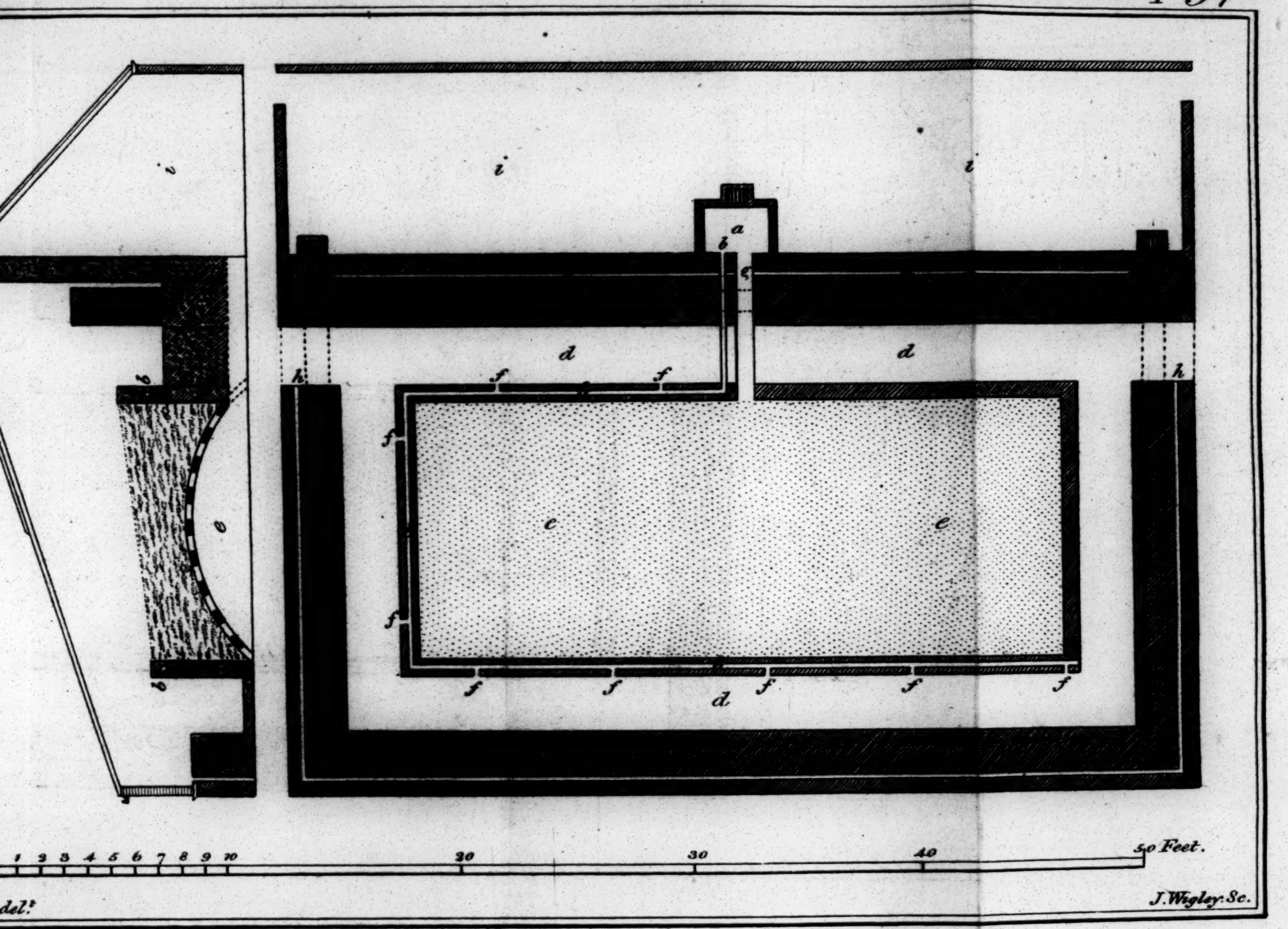
i Back ſheds.

N. B. The apertures or holes in the perforated Arch ſhould be covered with pieces of broken tiles or ſlate. And if at the filling of the bed the tan was to be ſcreened, and the coarſe parts of it put into the bottom of the tan-pit, it would admit the ſteam to riſe with greater facility.



A Steaming Stove.

Plate III. p. 97.



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I have not heard of more than two inſtances where ſteam has been adopted in Pine-ſtoves on the general plan of affording heat and moiſture both to the tan-bed and the body of the ſtove.*

I have been informed that in both the event proved unſucceſsful, and that the practice has been diſcontinued.‡

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[*] In the firſt ſteam is, by means of a perforated arch, conveyed under the bottom of the tan bed. In the ſecond it is conveyed by ſteam pipes to various parts of the ſtove. *See Plate* III.

[‡] Although the method of conveying ſteam under the tan-bed does not appear to anſwer for the culture of the Pine; ſtill it is very likely to prove an eligible expedient for forcing ſome kinds of early vegetables, &c. that are leſs impatient of moiſture.—Thus we ſee Cucumbers, Melons, Kidney-beans, and Early Potatoes (with many other articles in the line of forcing) grow luxuriant, and flouriſh beſt in a Hot-bed heat where there is a conſtant and ſtrong ſteam. Hence, this method may prove advantageous to Gardeners ſituate in places where early vegetables ſell at a high rate. On this conſideration I ſhall ſubjoin herewith a plan exhibiting the method of performing this new mode of practice.

It is natural to ſuppoſe that in a conſtant exceſs of moiſture both in the tan-bed and body of the ſtove, the Pine plants would decreaſe in their vigour, and their leaves ſoon become of a yellow hue; that the Vines would produce ſhoots weak and long jointed; and that the bunches of grapes would be conſtantly ſubjected to decay. However, by a moderate and judicious management, the ſteam-pipe may prove advantageous to Forcing-houſes in general, and the method is ſimple and eaſy.

To the boiler, which is uſually placed in the back ſhed, a tube or pipe muſt be affixed, and which muſt be conveyed through the back wall into the ſtove. From this tube or pipe, others of ſmaller dimenſions ſhould branch out, and be conveyed in a horizontal poſition to any part of the ſtove. Running round the bark pit is generally deemed the moſt convenient. To theſe horizontal pipes muſt be affixed a few perpendicular ones of yet ſmaller dimenſions; each of which muſt have a plug.

When ſteaming is required, you heat the boiler in the ſhed behind the ſtove; then take out the plugs from the perpendicular tubes, and you ſteam the ſtove in a few minutes to any degree required.

It may be neceſſary to remark, that great care ſhould be had in ſupplying the boiler with water; becauſe, if permitted to boil dry, it would endanger its breaking by having cold water put into it while it remains in a hot ſtate.

On the Covering of the Hot-houſe.

THE covering of the glaſſes in a Hot-houſe is not abſolutely neceſſary, even in our ſevereſt ſeaſons: Yet where the whole of the glaſſes are covered during the winter nights, much leſs fuel is required than in other Hot-houſes where there is no ſuch convenience: However, the ſaving in fuel is far from being adequate to the expence attending the covering; for beſides the firſt expence of the covers, and the daily one in putting them on and taking them off during the winter ſeaſon, we find, by experience, that more glaſs is broken thereby than by every other accident. But here it may be ſaid, that glaſs is alſo frequently broken in Hot-houſes that are not covered, by the ſeverity of the weather: This I grant is often

ten the caſe when the ſquares of glaſs are large, and when the glazing-work is injudicially performed. We know that thin window-glaſs (ſuch as is uſed for Hot-houſes) is an elaſtic body, and that its elaſticity increaſes and decreaſes in proportion to the temperature of the air.

The method of glazing in lead is now exploded; and what glaziers term *ſlate-glazing in putty*, is moſt generally adopted.

When ſquares of glaſs are cut of a large ſize, they are generally caſt or warped; therefore it is a practice with glaziers to tack them down with ſmall tacks or ſprigs, in order to make the work look neat. The glaſs bears this confinement during the time the weather is warm, but in a hard froſt, the ſquares ſo ſtrained frequently break.

The ſquares for a Hot-houſe, where covering is not intended, ſhould not be larger than 8 by 6 inches; and the groove in the wood-work to receive them ſhould be $\frac{5}{8}$ of an inch deep, which will admit of their being put in without ſtraining them in the leaſt from their natural form; they will then withſtand the ſeverity of the weather without danger. Added to this, there is a great ſaving in point of expence, by having the ſquares of glaſs of ſo ſmall a ſize, for the price of glaſs varies according to the different ſize of the ſquares: Beſides, as each ſquare, when put in with putty, has a bearing on two ſides only, ſmall ſquares muſt conſequently be the ſtrongeſt, and therefore the leſs liable to be broken.

In this place I muſt not omit taking notice of the common erroneous method of putting in the ſquares of glaſs, which is to let them lap over each other at leaſt an inch, and in ſome Hot-houſes an inch and a quarter; whereas $\frac{2}{8}$ of an inch is found quite ſufficient to keep out the rain that falls on the houſe, which will not only make a ſaving in glaſs, but is better in other reſpects; for the cavity between the ſquares ſoon gets filled with dirt, and ſo broad a ſpace between each ſquare being darkened, contributes to give the houſe a gloomy appearance. Beſides, the water that lodges between the ſquares in the winter is apt to freeze, in which caſe it expands, and thereby frequently cauſes the ſquares to break.

As glaſs is now become the principal object in point of expence in the building of a Hot-houſe, I flatter myſelf that what I have advanced on this head, will not be eſteemed an unneceſſary digreſſion.

Many ſmall Hot-houſes have for their covering a large ſheet of canvas, which, by the help of a roller and pullies, is moved up and down with great eaſe. This is an expeditious method of covering, and may be of great uſe on the approach of a large hail-ſtorm: Though inſtances of damage done this way rarely occur.

But where Hot-houſes are large, this mode of covering cannot ſo well be adopted; therefore the moſt general method is to uſe light covers of wood, or frames of wood, covered with painted canvas: The covering the whole of the roof of a Hot-houſe in this manner is very troubleſome, and attended with great expence; nor indeed is it abſolutely neceſſary, as I have obſerved above.

When either of the above methods are practiſed, it ſhould be done with diſcretion. In many places the covers of the Hot-houſes are ſometimes, in a ſnowy, dark, ſevere, or rainy ſeaſon, permitted to remain on for many days together, which is very detrimental to the plants, as they will in time draw themſelves weak by the continuance of ſuch a practice: For it is obſervable, that plants grow much faſter in the dark than in the light; and this is manifeſt from the progreſs of plants when firſt they ariſe from ſeed, in the open ground, in the ſpring of the year, when they do not grow half ſo much in the day as in the night: But here it muſt be obſerved, that the ſun and light give maturity to the nightly progreſs of plants, and the want of them ſoon cauſes the plants to grow languid, weak, and in time to die.

It is alſo a bad practice to continue to cover Hot-houſes late in the ſpring of the year, which is injudiciouſly done in many places, even ſo late as the middle of the month of May: For as the covers are ſeldom taken off till after ſix o'clock in the morning, (the hour that labourers come to their work at moſt places) it makes the Hot-houſe night too long at that ſeaſon of the year, when generally there are great numbers of the fruit of the Pine in bloſſom: For it ſhould be remembered, that *light* as well as *warmth*, is eſſentially neceſſary to promote the growth of plants.

In large double-pitted Hot-houſes the covering of the lower lights may be effected with great eaſe, and this is found to be of uſe on a double account; firſt, becauſe the Pine plants in the front pit, by ſtanding very near the glaſs, are in the moſt need of covering in ſevere weather; and ſecondly, becauſe the front pit is generally uſed for ſucceſſion plants, which require to be ſhaded, after being ſhifted in the ſpring, whenever the weather is warm and clear, as I have before obſerved in treating upon that head.

There is yet another mode of covering, which in this place merits our conſideration, viz. the ſcreening of the Hot-houſe from the violence of the ſun in very hot ſeaſons.

I have already obſerved in the former part of this work, that the fruit of the Pine, (particularly the kind called the Queen Pine) in the middle of ſummer is ſubject to crack in the middle, and when that is the caſe, it generally contains a very inſipid watery juice.

It is evident that this imperfection proceeds from the too violent heat of the Hot-houſe in the middle of ſummer; for we find that later in the ſeaſon they never have this defect. For the juice in the Pine decreaſes with the length of the days; ſo that late in the ſeaſon, its fault is generally that of being too dry.

It is obſervable too, that the young, or ſucceſſion Pine plants, do not make half the progreſs in violent hot weather in the middle of ſummer that they do later in the ſeaſon.

In order to obviate the above inconveniences, ſome perſons cover their Hot-houſes in the middle of the day, when the heat of the ſun is violent, with baſs-mats faſtened to a rope, which may be moved up and down with great eaſe.

But a better mode, and which is frequently practiſed, is, to cover the glaſſes with a large net, which admits the air to paſs freely, and at the ſame time breaks the rays of the ſun, and retards their force, eſpecially if the meſhes of the net be not large.

But if vines were judiciouſly trained up to the rafters of the Hot-houſe, there would be no need of either of the laſt-mentioned coverings. The vines ſhould be planted in the front of the Hot-houſe, and not more than one ſhoot trained to each rafter, part of which ſhould be cut down to the bottom of the rafters every ſeaſon, by which means the roof of the Hot-houſe may conſtantly be kept thinly covered with young wood, and by having only one ſhoot to each raſter, the vine leaves will afford a kindly ſhade, and never incommode the Pines; for the leaves fall, and the vines are pruned at a ſeaſon when the Hot-houſe moſt requires ſun.

The quantity of Grapes that may be produced in a Pine-ſtove is alſo a deſireable object, and the large bunches hanging from the roof, become an elegant as well as uſeful ornament to the ſtove.

The Method of uſing Oak-Leaves in Hot-houſes.

I Preſume that the leaves of the Oak abound with the ſame quality as the bark of the tree, therefore the ſooner they are raked up, after they fall from the trees, the better, as that quality will naturally decreaſe during the time they are expoſed to the weather.

After being raked into heaps, they ſhould immediately be carried to ſome place near the Hot-houſe, where they muſt lie to *couch*. I generally fence them round with charcoal-hurdles, or any thing elſe to keep them from being blown about the garden in windy weather. In this place we tread them well, and water them in caſe they happen to have been brought in dry. We make the heap ſix or ſeven feet in thickneſs, covering it over with old matts, or any thing elſe, to prevent the upper leaves from being blown away. In a few days the heap will come to a ſtrong heat. For the firſt year or two that I uſed theſe leaves, I did not continue them in the heap longer than ten days or a fortnight; but in this I diſcovered a conſiderable inconvenience, as they ſettled ſo much, when got into the Hot-houſe, as ſoon to require a ſupply. Taught by experience, I now let them remain in the heap for five or ſix weeks, by which time they are properly prepared for the Hot-houſe. In getting them into the Pine pits, if they appear dry, we water them again, treading them in layers exceedingly well till the pits are quite full. We then cover the whole with tan to the thickneſs of two inches, and tread it well till the ſurface become ſmooth and even. On this we place the Pine pots in the manner they are to ſtand, beginning with the middle row firſt, and filling up the ſpaces between the pots with tan. In like manner we proceed to the next row till the whole be finiſhed; and this operation is performed in the ſame manner as when tan *only* is uſed.

After this the leaves require no farther trouble the whole ſeaſon through, as they will retain a conſtant and regular heat for twelve months without either ſtirring or turning; and if I may form a judgment from their appearance when taken out, (being always entire and perfect) it is probable they would continue their heat through a ſecond year; but as an annual ſupply of leaves *here* is eaſily obtained, ſuch a trial *with us* is hardly worth the trouble of making. However, as a ſaving in leaves may be an agreeable object in places where they are leſs plentiful, I was induced to make the following experiments. In 1777, one of the Pine pits was filled with one part of old and two parts new leaves well mixed together. And the next year (1778) one pit was filled with old and new leaves in equal quantities. In both theſe experiments I had the ſatisfaction to find the pits, ſo filled, to retain a heat through each ſeaſon, equal to the other pits that were filled entirely with new leaves; and ſince that time we have always uſed the whole of the undecayed leaves, mixed along with the new ones.

I alſo have conſtantly uſed the leaves after they were taken out of the Hot-houſe in the early-made hot-beds, and always found them to anſwer quite as well as freſh leaves.

I muſt beg leave to obſerve, that when the leaves are intended to be uſed a ſecond time, it will be proper at the taking them out of the pits to remove ſome few at the top, as alſo on each ſide, becauſe the leaves at the top and outſide of the pit approach moſt to a ſtate of decay.

After this the Pines will have no occaſion to be moved but at the ſtated times of their management, viz. at the ſhifting them in their pots, &c. when at each time a little freſh tan ſhould be added to make up the deficiency ariſing from the ſettling of the beds; but this will be inconſiderable, as the leaves do not ſettle much after their long *couching*. During the two firſt years of my practice I did not uſe any tan, but plunged the Pine pots in the leaves, and juſt covered the ſurface of the beds, when finiſhed, with a little ſaw-duſt, to give it a neatneſs. This method was attended with one inconvenience; for by the caking of the *leaves* they ſhrunk from the ſides of the pots, whereby they became expoſed to the air, and at the ſame time the heat of the beds was permitted to eſcape.

Many powerful reaſons may be given why Oak-leaves are preferable to tanners bark.*

Firſt, They always heat regularly; for during the whole time that I have uſed them, which is near twenty-five years, I never once knew of their heating with violence; and this is ſo frequently the caſe with tan, that I affirm, and indeed it is well known to every perſon converſant in the management of the Hot-houſe, that Pines ſuffer more from this one circumſtance than from all other accidents put together, inſects excepted. When this accident happens near the time of their fruiting, the effect is ſoon ſeen in the fruit, which always comes ill-ſhaped and exceedingly ſmall. Sometimes there will be little or no fruit at all; therefore Gardeners who make uſe of tan *only* for their Pines, ſhould be moſt particularly careful to avoid an *over-heat* at that critical ſeaſon——the time of *ſhewing* fruit.

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* I believe that Oak-leaves are preferable to thoſe of any other ſort; but I have found by repeated trials that the leaves of Beech, Spaniſh Cheſnut, and Hornbeam, will anſwer the purpoſe very well. It ſeems that all leaves of a hard and firm texture are very proper; but ſoft leaves that ſoon decay, ſuch as Lime, Sycamore, Aſh, and of Fruit Trees in general, are very unfit for this mode of practice.

Secondly, The heat of Oak-leaves is conſtant; whereas tanners bark generally turns cold in a very ſhort time after its furious heat is gone off. This obliges the Gardener to give the tan frequent turnings in order to promote its heating. Theſe frequent turnings, not to mention the expence, are attended with the worſt conſequences; for by the continual moving of the pots backwards and forwards, the Pines are expoſed to the extremes of heat and cold, whereby their growth is conſiderably retarded ; whereas, when leaves are uſed, the Pines will have no occaſion to be moved but at the times of potting, &c.—The Pines have one particular advantage in this undiſturbed ſituation ; their roots grow through the bottoms of the pots and matt amongſt the leaves in a ſurpriſing manner. From the vigour of the plants, when in this ſituation, it is highly probable that the leaves, even in this ſtate, afford them an uncommon and agreeable nouriſhment.

Thirdly, There is a ſaving in point of expence, which is no inconſiderable object in places where tan cannot be had but from a great diſtance, as is the caſe here, the article of carriage amounting to ten ſhillings for each waggon-load. Indeed this was the principal reaſon that firſt induced me to make trial of leaves.

My laſt ground of preference is the conſideration that decayed leaves make good manure; whereas rotten tan is experimentally found to be of no value. I have often tried it both on ſand and clay, alſo on wet and dry lands, and never could diſcover, in any of my experiments, that it deſerved the name of a manure; whereas decayed leaves are the richeſt, and, of all others, the moſt ſuitable for a garden. But this muſt only be underſtood of leaves after they have undergone their fermentation, which reduces them to a true vegetable mould, in which we experimentally know that the food of plants is contained—but whether that food be *oil*, *mucilage*, or *ſalt*, or a combination of all three, I leave to philoſophers to determine. This black mould is, of all others, the moſt proper to mix with compoſt earth, and I uſe it in general for Pines, and almoſt for all plants that grow in pots: For flowers it is moſt excellent. The remainder of this vegetable mould may be employed in manuring the quarters of the Kitchen-Garden, for which purpoſe it is highly uſeful.

Leaves mixed with dung make excellent hot-beds—and I find that beds, compounded in this manner, preſerve their heat much longer than when made entirely with dung. In both caſes the application of leaves will be a conſiderable ſaving of dung, a circumſtance very agreeable, as it will be the means of preventing the conteſts frequently obſerved, in large families, between the Superintendant of the Garden and the Directors of the Huſbandry.

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EXPLANATION of PLATE IV. p. 121.

FIG. 1.

Shews the brown turtle inſect, *Coccus Heſperidum*, in its various ſtates.

a A full-grown female inſect as it appears on the leaf of the Pine.

b Ditto, as it appears on the under-ſide.

c The young brood as they appear to the naked eye when the parent inſect is taken off.

d One of the inſects in that ſtate magnified.

e The perfect fly, or male, of a ſimilar ſpecies of Coccus magnified.

As I have never ſeen the male of the Coccus Heſperidum, the male of a ſimilar ſpecies of Coccus, found upon the peach tree and delineated by Schæffer, is here repreſented. With this it is probable the male of the Coccus Heſperidum correſponds.

FIG. 2.

Shews the white ſcaly inſect in its various ſtates.

f A full-grown female inſect.

g The young brood as they appear to the naked eye when the parent inſect is taken off.

h One of the inſects in that ſtate magnified.

i Tubular ſcales that contain the male inſects as they appear to the naked eye on the leaf of the Pine.

k Ditto magnified.
l Two perfect flies, or male inſects, magnified.

FIG. 3.

Shews the white mealy crimſon-tinged inſect, commonly called Pine-Bug.

m A full-grown inſect.

n Ditto as it appears on the under-ſide.

Plate IV. p. 121.

Three Species of Pine Insects.

Fig. 1.

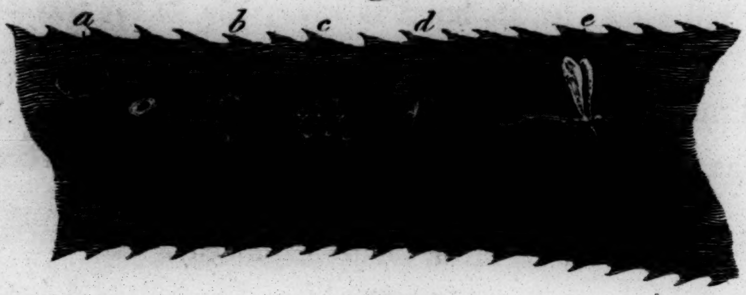


Fig. 2.

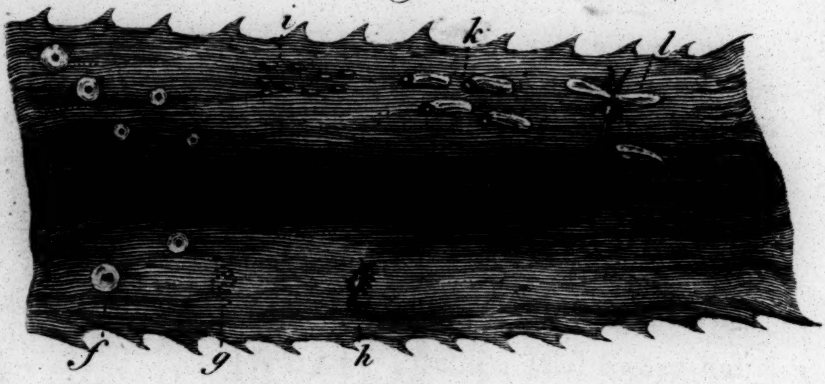
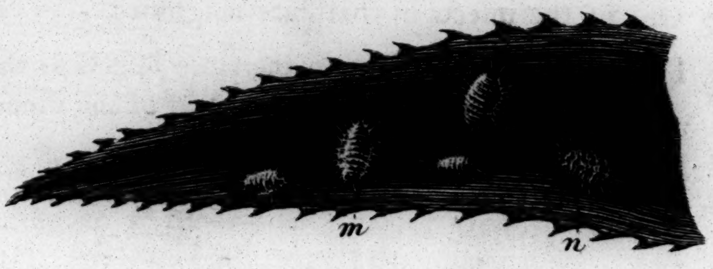


Fig. 3.



W.m Speechly pinx.

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BOOK II.

On the three Species of INSECTS *that infeſt the* PINE APPLE PLANT, *with an effectual Method of deſtroying them.*

OUR Nobility and Gentry, with a ſpirit for gardening not equalled by any other nation, have of late years been at great expence in building large and elegant Hot-houſes, in order to have the Pine Apple in as great perfection as this climate will admit. Yet, after all, they are frequently diſappointed in their hopes of ſucceſs; not ſo much from the miſmanagement of theſe plants in point of culture, as from the injury they receive from certain inſects, brought with, and generally found upon, moſt of the Pine plants which come directly from the Weſt Indies.

There are three kinds of inſects which breed upon the Pine Apple plant. Theſe are common in many ſtoves in this kingdom.

1. The BROWN TURTLE INSECT. *Coccus Heſperidum* Linn. This ſpecies is not only found upon the Pines, and moſt other plants which grow in Hot-houſes, but alſo upon many plants which are kept in Green-houſes. Theſe inſects, after they are arrived at a certain age, fix themſelves immoveably to the leaves of the plant; but, before that time, though they generally appear motionleſs, yet on a cloſe inſpection, in a very warm day, many of them, and eſpecially the ſmaller ones,

may be perceived to move to different parts of the plant, being in appearance much like a turtle in miniature.

A ſweet glutinous matter iſſues from theſe inſects; this ſoon turns mouldy, and in time becomes quite black, which cauſes the plants to appear very unſightly. But as theſe inſects do not in any other reſpect injure the Pine plants, I ſhall paſs them over, and proceed to thoſe of a more pernicious nature.

2. The WHITE SCALY INSECT*. This ſpecies is very nearly allied to the former, both of them being *Cocci*, and of the oviparous kind: it ſeems to be exactly ſimilar to it in its manner of breeding, the proceſs of which the curious

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* This inſect has hitherto remained undeſcribed. Neither Linnæus, Geoffroy, Scopoli, or Schæffer ſeem to have known it.

rious naturaliſts in this branch have obſerved to be nearly as follows: The eggs, which are diſcharged from the female, are puſhed forward between the ſkin of the belly and the leaf of the plant to which the inſect adheres; in conſequence of this, the ſkin of the belly becomes leſs diſtended, which enables the inſect to afford a larger covering to the eggs already excluded. When the eggs are *all* diſcharged, the ſkin of the belly retreats *cloſe* to the back of the parent inſect, which then appears like a mere ſcale. If the inſect in this ſtate be raiſed, with the point of a needle, from the leaf, a number of eggs may be perceived under it, of a pale red colour, and very tranſparent, not unlike the roe (or eggs) of fiſhes; but with this difference, that they are not connected by a membrane, but looſely packed together. The mother, with a parental care, not only thus broods over her eggs till they are hatched, but continues to protect her young for a conſiderable time after, and either dies during the time ſhe is performing this laſt office for them, or very ſoon after.

The males of both the above ſpecies are much leſs than the females, and appear very different from them; the latter, except juſt in their infant ſtate, never aſſuming any other form than that of a ſcale, already deſcribed; whereas the males of both kinds, in their laſt ſtate, become flies; but neither of them can probably do any injury to the Pine plants whilſt they are in that form: for the *flies* of none of the *Coccus* kind have been found, on the ſtricteſt examination by the moſt able naturaliſts, to have any organ by which they can take in nouriſhment. In that ſtate, therefore, they probably continue but a ſhort time, the whole buſineſs of their lives being then deſtined to the impregnation of the females.

I have hitherto only taken notice of the *round* ſcale, which is the female inſect, and which is much the moſt conſpicuous, being far larger than the male. But a careful obſerver will readily perceive, where *theſe* ſcales are numerous, another ſet of ſmaller ones intermixed with them, which, if he be unacquainted with the natural hiſtory of theſe inſects, he will hardly ſuſpect to belong to the ſame animal, as they put on ſo different an appearance. They are ſemitubular, and their length ſcarce exceeds the diameter of one of the ſmall *round* ſcales, and their breadth is not more than a third or fourth part of their length: Theſe, however, contain the males in one of their laſt ſtages, under which they aſſume the form of *nymphs*, and become flies. In order to be ſatisfied of this, a perſon need only break open, with the point of a needle, a few of theſe ſcales, when they are arrived at maturity, and he will perceive contained within each of them a very beautiful, but ſmall fly, with all the characters of the flies of the *Coccus* kind.

The length of this fly from the head to the tail, excluſive of the wings, and thoſe long hairs which are ſo characteriſtic of the flies of this kind, is about the thirtieth part of an inch; and the length, including the wings when folded one over the other on the back of the fly, excluſive of the hairs before-mentioned, is about the eighteenth part of an inch. A deep magnifying glaſs muſt be uſed to diſtinguiſh the parts of theſe flies, as they are too ſmall to be ſeen by the naked eye.

The Inſects of this laſt-mentioned ſpecies are of a very pernicious nature. When Pine plants are infeſted with them, there will be much trouble and great expence in cleaning them, even to keep the inſects under; and notwithſtanding the greateſt care, the plants will ſuffer much, and in time grow very unſightly; their leaves will appear yellow and ſickly, and generally a great number of yellow tranſparent ſpots may be ſeen all over them. On the leaſt neglect in deſtroying them, they will increaſe innumerably, and ſo beſet the lower parts of the leaves next the ſtem of the plant, (where they are moſt numerous) with ſcales, as nearly to touch each other. And as they pierce that part of the leaf immediately under the ſcale with their proboſcis, they thereby not only draw out the nutritious juices themſelves, but alſo deſtroy the tubes through which they flow. The upper parts of the leaves being thus deprived of their nouriſhment, fall down, and conſequently die.

But I have never found that theſe inſects attack the roots of the Pine, as has been frequently aſſerted.

Some perſons alſo aſſert that the laſt-deſcribed, and the following ſpecies of inſects, are one and the ſame; that they breed under the ſcales, and afterwards deſcend to the roots of the Pine, and, when grown to maturity, are the large white mealy Pine-Bug. But the error of this opinion is clearly evinced from hence, that ſome Hot-houſes are infeſted with the one, and not with the other.

3. The WHITE MEALY CRIMSON-TINGED INSECT*. This ſpecies alſo has all the characters of a Coccus, but in all probability belongs to another ſubdiviſion of that genus of inſects. For whereas the two former ſpecies are undoubtedly oviparous, this ſeems on the contrary to be viviparous. It is moſt probable that the young ones remain ſome time in the mealy down of the mother, till they have acquired ſtrength, and are arrived at ſuch a degree of perfection as to enable them to ſupport themſelves—when they forſake

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* This inſect, as well as the former, has hitherto remained unnoticed by Entomological Writers.

the parent inſect, and diſperſe themſelves to different parts of the plant.

When this ſpecies is firſt perceived on the leaves of the Pine, it appears to be nothing more than ſmall particles of meal, or powder, collected together; but in a few days it aſſumes the form of a louſe or bug, thickly covered with a fine meal or down, of an oval form on its upper, and very flat on its under ſide, from whence proceed its legs, which are ſix in number. Theſe, as well as many other particulars in the above deſcription, are not to be diſtinguiſhed without the help of glaſſes.

I hope for the indulgence of my candid readers, in caſe the natural hiſtory and deſcription of the three ſpecies of inſects which I have attempted to give them, ſhould be found inaccurate or erroneous.

roneous. I do not preſume to give an hiſtorical and regular deſcription of theſe inſects, the principal object of this treatiſe (the reſult of many years application and experience) being to point out to my ſubſcribers a ſure and eaſy method of extirpating them; yet I thought it needful to mention ſome general characteriſtics of every ſpecies which has hitherto been diſcovered on the Pine Apple plant, in order to ſhow that every one hitherto known, had come within my obſervation; and had conſequently proved the efficacy of the remedy which I take the liberty of offering to the public.

This laſt-deſcribed ſpecies is of a more pernicious nature than the former; it attacks every part of the plant, from the top of its fruit even to the moſt extreme parts of its root. Theſe animals wedge themſelves in between the protuberances of the fruit in a moſt ſurpriſing manner, ſo as not to be got out without great difficulty, which not only makes the fruit appear very unſightly when it becomes ripe, but, by robbing it of its nutritious juices, is the cauſe alſo of its wanting flavour and being ill taſted.

But the bad effects of this ſpecies on the *roots* of the plants, are yet of a far worſe conſequence; for there, even at the bottom of the pots, they increaſe with an uncommon degree of rapidity, ſo as ſoon to become very numerous, and in the end to deſtroy the principal roots of the plants. The common method to extirpate them from this ſituation, is, by ſhifting the plants in their pots; at the ſame time cleanſing their leaves and the roots, which is uſually ſtiled a DRESSING. Decoctions made from tobacco, wormwood, walnut-leaves, henbane, and other herbs of a bitter or poiſonous quality, are generally uſed on this occaſion; and, by ſome, ſnuff, ſulphur, and pepper are added: But none of theſe prove to be of a nature ſufficiently penetrating. There are inſects always between the leaves in the centres of the plants, fixed ſo low as to eſcape unhurt; and as they increaſe, the Pine plants are ſoon reduced to the very ſituation I have juſt before deſcribed, which perplexes and gives the Gardener everlaſting vexation. Beſides, it is evident that this unſeaſonable buſineſs of ſhifting and dreſſing the plants, will conſiderably retard their growth, and bring upon them a ſickly appearance, eſpecially in their laſt ſtage, viz. their fruiting ſeaſon.

It is obſervable that the two laſt ſpecies of inſects multiply faſter on old and ſickly plants than on thoſe that are young, and in a more vigorous ſtate. Indeed, the caſe of vegetables ſeems very ſimilar to that of animals.——From theſe obſervations I infer, that theſe inſects cannot be nearly ſo prejudicial to the Pine plant in warm climates as with us; for there they are always in a vigorous growing ſtate, and fruit at a more early ſeaſon.

It will be a matter of much importance to perſons that have Pine plants infeſted with one or both of the laſt ſpecies of inſects, to know a cheap, eaſy, and certain method of cure. Indeed, ſuch a knowledge will be very deſirable to perſons who have Hot-houſes that are clear of theſe vermin; for then they may ſafely admit any Pine plants from warm climates, which will enable them, without the leaſt danger, to ſupply their ſtoves with new and better kinds.

It may not be diſagreeable to my readers to be informed of the particulars of my ſucceſs in the buſineſs of deſtroying theſe inſects, which indeed ſuggeſted to me the preſent method of cure, the efficacy of which, confirmed by between twenty and thirty years experience, I can ſafely venture to recommend.

In the year 1767, when firſt I came to ſerve his Grace the Duke of Portland, I found the Pine plants in the Hot-houſes at Welbeck intirely over-run with both the laſt ſpecies of inſects. Knowing that I could do myſelf no credit in raiſing Pines (an object of emulation amongſt Gardeners) while theſe vermin remained, I became exceedingly ſolicitous to extirpate them. The large Hot-houſe being at that time divided into three, by glaſs-frame partitions, the firſt ſtep I took towards effecting the above purpoſe was to remove the infected Pine plants from one of the ſmalleſt of theſe diviſions. This was afterwards ſtocked with plants from ſtoves clear of theſe vermin; which plants were propoſed to be increaſed, and the old ſtock in the other diviſions, from time to time, rooted out. But, notwithſtanding every care was taken, as changing the tan, waſhing the Hot-houſe, &c. I had the mortification to find, in the courſe of a few months, that this ſtock was over-run with the laſt ſpecies of inſects. This ſhews that theſe vermin, at certain ſeaſons, move to every part of a Hot-houſe; it will alſo ſerve to ſhew that too great care cannot be taken in cleaning every part of the Hot-houſe, at the time of performing the operation of the method of cure hereafter recommended.

After this diſappointment I endeavoured to deſtroy theſe vermin by every method I had heard of, both from public and private information. Amongſt the former much was promiſed.—The ſteam of a hot-bed made of horſes dung, alſo decoctions made from the ſeveral ſorts of herbs, &c. before-mentioned, have, in their turns, been recommended as effectual: But on trial they proved only impoſitions on the public. The application of oil and ſpirits has likewiſe done the ſame unkind office. Steeping the pine plants in water, heated to a certain degree, regulated by the Thermometer, was ſaid to deſtroy theſe inſects, without injuring the plants. I tried all the above, with many more propoſed methods of cure, and although the greateſt care was taken in performing each experiment, yet I conſtantly found myſelf diſappointed.—I generally made my experiments on ſmall Pine plants, for the convenience of keeping them in melon-frames, each parcel apart by itſelf.

Oil, or ſpirits of wine, will certainly deſtroy theſe inſects inſtantly: This has been obſerved by many Gardeners, and has induced them to affirm that they had found out the long-wiſhed-for ſecret. Had either of theſe methods of cure ſucceeded, the proceſs would have been very expenſive; but the misfortune is, if either of them be applied in large quantities, they inſtantly deſtroy the plants as well as the inſects: And if the inſects are to be found before the remedy be applied, they may as eaſily be deſtroyed by any other means. I have already obſerved, that there are inſects fixed ſo low between the leaves in the centres of the plants, as not to be found on the moſt diligent ſearch, and the difficulty has always been to deſtroy theſe inſects in that ſituation.

The getting oil to incorporate effectually with water, ſeemed an inſurmountable difficulty: And it was no leſs difficult to preſerve a ſufficient efficacy in the ſpirits, as it was neceſſary to lower them (or let them down as it is termed) with water, leſt the plants ſhould be injured. From theſe conſiderations it is manifeſt, that neither of theſe diſcoveries will anſwer the intended purpoſe.

I obſerved that the meal, or down, deſcribed on the laſt ſpecies of inſects (which meal or down, I preſume, like the feathers of water-fowl, greatly abounds with oil) prevented the decoctions from getting to the inſects, even after a ſteeping of twenty-four hours: From thence I was led to imagine that ſomething of a very penetrating nature was requiſite to deſtroy them. After many experiments, and due conſideration of the nature of theſe inſects, I luckily happened to think of a remedy which hitherto has proved effectual;* and I ſubmit it to the Public with the moſt exact preciſion.

I firſt tried it on a few Pine plants, and afterwards upon the whole ſtock, and in both caſes with the greateſt ſucceſs, not one of theſe deſtructive inſects having been ſince ſeen in the Hot-houſes here.

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* Since the firſt Publication of this Work, I have received, from the moſt reſpectable authority, numerous and ſatisfactory accounts reſpecting the efficacy of the method here recommended.

From the time above-mentioned to the preſent, (twenty-four years) his Grace has ſeveral times had Pine plants ſent from different parts of the Weſt Indies, which were generally infeſted with one or both of the laſt ſpecies of inſects; theſe plants, after the operation, I have put amongſt our ſound ſtock, and always with the greateſt ſafety.

The RECEIPT.

TAKE one pound of Quickſilver. Put it into a glazed veſſel, and pour upon it one gallon of boiling water, which let ſtand till it becomes cold; then pour off the water for uſe. Repeat this on the ſame Quickſilver (for it will retain its powers) till a ſufficient number of gallons are provided to fill a veſſel intended for the purpoſe. One in the form of a trough, that will hold eight or ten gallons, is the moſt convenient, eſpecially for the large-ſized plants.

Then to every gallon of this mercurial water add ſix ounces of ſoft green ſoap, diſſolved in a portion of the prepared water. Let the mixture ſtand till it becomes about milk-warm, which is the degree of warmth it muſt be kept to during the time of dipping, which operation is performed in the following manner:

[Before the plants are taken out of their pots, I would adviſe the bruſhing off a few of the ſcaly inſects, (as in a common dreſſing) eſpecially towards the bottom of the leaves, where they will ſometimes be ſo numerous as in appearance to lie one upon another, in which caſe the mixture might be prevented from penetrating to the bottom inſects. I do not know that this buſineſs of bruſhing is abſolutely neceſſary, but as the whole operation in a large Hot-houſe may be performed in one day, the labour of a perſon or two extraordinary for this purpoſe can amount but to a very inconſiderable expence.]

The leaves of the large-ſized plants ſhould then be tied together; they will be more manageable in this form than with their leaves looſe, and leſs liable to be damaged.—The plants ſhould then be taken out of the pots and diveſted of their roots, as alſo of a few of the decayed leaves at the bottom.

The laſt ſpecies of inſects (by Gardeners moſt generally called Pine-Bug) will ſometimes conceal themſelves in holes at the bottom of the ſtem of the plants, eſpecially in large plants; and as the mixture might be prevented from penetrating into thoſe holes, by the air contained in them, care ſhould be taken to examine that part with great circumſpection.

[It may not be amiſs in this place to obſerve, that the earth which comes out of the Pine pots, together with the leaves and roots taken from off the plants, ſhould be removed to a conſiderable diſtance from the Hot-houſe. Alſo that the pots, out of which the Pine plants were taken, ſhould not be uſed again for that purpoſe, without firſt being put into boiling water.]

The Pine plants being now ready, let them be put into the mixture, in which they ſhould remain, with every part covered, for the ſpace of three minutes; then take them out, firſt letting the tops decline for the mixture to drain out of their centres. The veſſel ſhould be immediately filled with freſh plants, and thoſe taken out ſet in the open air to dry with their roots *downwards*; for by placing them in that poſition the mixture will deſcend, and penetrate to the very bottom of the leaves in the centre of the plant, whereby the inſects which are concealed there will be totally deſtroyed. The mixture will change the plants to a ſad green colour, which will give them the appearance of being ſpoiled; but, as they become dry, they will in a great meaſure reſume their proper hue.

During the operation it will be neceſſary to add a ſupply of hot mixture, in order to keep the whole to a proper degree of warmth, as alſo to make up the deficiency which muſt naturally happen.

If the veſſel intended for the mixture be made, as above deſcribed, to hold ten or a dozen large Pine plants at one time, two men will dip and ſet, &c. about one hundred in an hour, and double that number of the leſſer-ſized ones.

It will be proper to do this work in a fine day, and as ſoon in the forenoon as convenient, that the plants may have time to dry, which they will do in a few hours, and then they muſt undergo the ſame operation a ſecond time.

In the next dipping, one table ſpoonful of ſweet oil ſhould be added to every gallon of the mixture. If a table ſpoonful of oil and two ounces of green ſoft ſoap be put together, and a little *prepared* boiling water poured thereon, the oil will moſt readily incorporate.

The proceſs of the ſecond operation being exactly the ſame as the firſt, a repetition thereof is unneceſſary.

After the ſecond dipping, a ſpunge ſhould be uſed to remove any unſightly matter left on the leaves of the plants. They ſhould then be ſet to dry with their tops *downwards*, that the mixture may drain from every part; for it is neceſſary that every part of the plant ſhould be quite dry before it is planted.

During the performance of the above operations, a ſufficient number of labourers ſhould be employed in getting the Hot-houſe ready for the reception of the plants, [as changing the tan, and cleaning every part of the Hot-houſe; and if the inſide of the roof were painted at the ſame time it would be better. Alſo, it might be ſerviceable if a ſmall fire was made in the Pine pit with charcoal and ſulphur, and the houſe ſhut up an hour or two to keep in the ſteam. But in caſe there are vines growing in the Hot-houſe, this laſt operation muſt be omitted] which work muſt be done with great caution, as I have already obſerved.

If the above work cannot be done in one and the ſame day, the Pine plants may with great ſafety be ſet in a dry airy place for a day or two, provided they are not put into heaps, which would greatly damage them in a ſhort time.

The mould intended for the Pine plants at the firſt potting, ſhould be light and fine: And I would recommend that the pots be ſmall in proportion to the ſize of the plants, that each plant may be what Gardeners term UNDER-POTTED; they will ſtrike root both ſooner and better than if put into larger pots, and at their next ſhifting they will go into proper-ſized pots, with their balls and roots entire. At this ſhifting the mould uſed ſhould neither be ſo light nor ſo fine as recommended for the firſt.

After the Pine plants are replaced in the Hot-houſe, it will be proper to ſhade the glaſſes in the middle of the day, whenever the weather is warm and clear.

The houſe ſhould be conſtantly kept to a great degree of heat, which will be the means of making the plants ſtrike ſooner and ſtronger; it being evident that they cannot draw themſelves weak while in an inactive ſtate: However, as ſoon as the plants are perceived to grow, it will be neceſſary to give them by degrees a greater quantity of air.

Great care ſhould be taken to prevent the roots of the plants from being injured by an over-heat of the tan, which may be done by raiſing the pots, in caſe the tan ſhould heat violently. Should oak-leaves be uſed inſtead of tan, as is the caſe at Welbeck, this laſt caution will be unneceſſary.

The plants will require to have no water given them for at leaſt ten days or a fortnight from the time of their being replaced in the Hot-houſe, and then it ſhould be given very ſparingly; only a little with a pipe (uſed in Hot-houſes) juſt to prevent the ſurface of the mould in the pots from drying too much, as in that caſe it would crack, and admit the air to the roots of the plants. But the plants ſhould not be watered over their leaves in leſs time than ſix weeks from their dreſſing.

For a twelvemonth after the deſtruction of the inſects, I conſtantly kept a pound of Quickſilver, in a glazed veſſel, at the bottom of the ciſtern which contained the water for the uſe of the Hot-houſe. Whether the Quickſilver impregnated the water in ſuch a manner as to be of any real uſe, I do not pretend to ſay: However, this I can with truth affirm, that I never ſaw Pine plants grow with greater vigour than thoſe did at that time. And as every other kind of plant in the Hot-houſe was watered at that time with the ſame *impregnated* water, and as all of them were remarkably healthy and vigorous, it is evident that there was nothing prejudicial in the uſe of it: No expence attends ſuch a trial, for the Quickſilver neither decreaſes in its quantity or value by either of the foregoing experiments.

The moſt eligible ſeaſons for the dreſſing of the Pine plants, are the months of March and September; the former is moſt proper for ſmall or ſucceſſion plants, but cannot be practiſed on them except in places where there is a variety of Hot-houſes apart from each other; and when there is that convenience, March is greatly to be preferred: At that ſeaſon I ſtrongly recommend that the tan-bed be prepared eight or ten days before, and the pots plunged therein, as the plants will be very greatly benefited by being put immediately into a good heat. But when the dreſſing is to be general, the latter month is the moſt proper; the crop of fruit at that ſeaſon being commonly nearly over, that part of it which remains may eaſily be preſerved in hot-beds till it is ripe, by contrivances made with melon-frames, which at that ſeaſon are generally out of uſe.

I have already obſerved, that the laſt ſpecies of inſect, called the PINE-BUG, moves to every part of a Hot-houſe; but it is probable that this may be *only* in the very hot part of ſummer: Therefore it may be ſuppoſed that at the above ſeaſons they are in general upon the Pine plants.

A farther reaſon that recommends the above ſeaſons is, that they are the moſt proper for ſhifting the Pine plants in the pots; and it is at thoſe ſeaſons that the generality of Gardeners perform that buſineſs.

It may be thought by perſons unacquainted with the management of the Pine Apple plant, that the plants receive a material injury by the loſs of their roots at the time of dreſſing: But experienced Gardeners prefer that method to removing them with balls of earth at their roots at the time of ſhifting them in the ſpring. I have frequently tried both methods, and always found that the plants removed with balls of earth at their roots, had a little advantage at firſt; but, in the courſe of the ſummer, the plants with freſh mould entire, always made the greateſt progreſs.

Having thus deſcribed my method of deſtroying theſe moſt troubleſome inſects, and gone through the whole proceſs minutely in all its parts, I ſhall now beg leave to make a few neceſſary obſervations.

First, Was the method of putting Quickſilver in the ciſtern, which contains the water for the uſe of the Hot-houſe, to be depended upon as effectual, there would be no other way of deſtroying theſe inſects ſo cheap and eaſy. That buſineſs would be done in the common courſe of watering the plants, and there is a probability of its being ſucceſsful: For it is evident that the inſects, whether at the roots or upon the leaves of the Pine, ſubſiſt on the juices of the plants; and it may be poſſible for the plants to imbibe a certain quality from the Quickſilver ſufficient for the above purpoſe. However, as I verily believe that the inſects were totally deſtroyed *here* before I tried the above method, I cannot ſay any thing in regard to its efficacy. Yet it would be well if a trial of this ſort were made; in which caſe I would recommend, for a ſhort time, the farther trouble of boiling the water when put upon the Quickſilver.

SECONDLY, The mealy ſubſtance on the under-ſide of the leaves of the Pine is of ſuch a nature as ſeemingly to reſiſt all watery matter, and has therefore prevented all decoctions, hitherto uſed for the above purpoſe, from penetrating to the bottom of the leaves in the centre of the plants, whereby inſects in thoſe parts have always eſcaped.

Thirdly, It is allowed, that if boiling water be poured upon a ſufficient quantity of Quickſilver, it receives a power capable of deſtroying lice or inſects: But there wanted ſomething to enable it to reach to the inſects in queſtion. Soap ſeemed to be the moſt proper vehicle for that purpoſe on a double account: It is a penetrating ſubſtance, and contains a quality of the former nature.

Fourthly, Soap-ſuds have perhaps as great powers of penetration as oil: But oil being added to the ſecond dipping, muſt make the mixture of equal force. From hence it is probable that the directions given in reſpect to bruſhing the inſects from off the leaves of the Pine, as alſo the nice inſpection recommended, may be quite unneceſſary.

FIFTHLY, The quantity of ſoap uſed renders the mixture of a thick ſlimy conſiſtence, and conſequently leaves a kind of coat, or covering, upon the leaves of the Pine, which very probably may prevent the inſects from remaining, or even coming upon the plants, in caſe any of them were left in the Hot-houſe. For this reaſon no water ſhould be given over the leaves of the plants in leſs time than ſix weeks from their dreſſing, as I have already obſerved *.

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* Soap-ſuds effectually deſtroy the different ſpecies of inſects that infeſt fruit-trees growing againſt walls. Of theſe inſects the APHIS is the moſt common as well as the moſt deſtructive. It generally attacks, with great violence, the peach, cherry, and plumb. The Aphides are univerſally known by the appellation of *Lice*.

Lastly, The Pine plants, after their dreſſing, fill the Hot-houſe with a ſtrong-ſcented effluvium, which continues a conſiderable time. It perhaps may be ſo nauſeous

The Acarus, though not ſo fatal to plants growing in the open air as when under glaſs, is alſo very prejudicial to the above trees, when planted againſt walls.

The Thrips are ſometimes very numerous on peach and nectarine trees, but they are leſs hurtful than either of the former ſpecies: Beſides the above, there are two or three ſorts of the *Cocci* that are very common upon fruit-trees, but as they adhere very cloſely to the branches, they are not ſo conſpicuous, and conſequently leſs known. However, trees that are much infeſted with the *Cocci* are in the ſummer very diſtinguiſhable, as waſps conſtantly attend theſe inſects to feed on the ſweet matter that iſſues from them. When the *muſcle-ſhaped Coccus* has been very numerous, I have known hive bees frequent the trees in great abundance.

In the ſpring, the *Aphis*, the *Acarus*, and *Thrips*, are few in number, in compariſon to what they are in the ſummer: However, I have conſtantly obſerved the two former ſpecies on the buds of the trees before they break into leaf, eſpecially on ſuch trees as have been much infeſted with them the preceding ſummer.

It is moſt probable that the inſects that ſurvive the winter, in whatever ſtate, are concealed during that period either under the branches of the trees, or in the ſhreds that nauſeous to the inſects in queſtion as to deſtroy them; or at leaſt to cauſe them to abandon the place, and eſcape through crevices into the open air, where, in all probability, they ſoon periſh.

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that faſten them to the wall; elſe in the nail-holes or crevices of the wall: In all theſe ſituations the ſoap-ſuds have fully anſwered my moſt ſanguine expectations. The operation is far from being either troubleſome or expenſive; and the method is practicable at any ſeaſon, but more eſpecially between the fall of the leaf and the time the bloſſom buds are nearly ready to open. Proceed thus:

Take any quantity of ſoap-ſuds after a common waſhing; but when they are thick and ſtrong they ſhould be lowered with water. A perſon on a ladder ſhould pour them from a watering-pot over both trees and wall, beginning at the top of the wall, and bringing it on in courſes from top to bottom. The ſuds, when uſed, ſhould be many degrees warmer than new milk, eſpecially in the winter; and when plentifully and properly applied, every part of the wall will appear of a pale red colour, not in the leaſt diſagreeable.

Moſt large families, in the courſe of a few months, make a quantity of the above liquid ſufficient to waſh a great extent of wall. The ſoap-ſuds made here this laſt winter have been ſufficient to waſh all the principal walls in Welbeck garden. Beſides the advantage of deſtroying inſects, the ſuds appear to be productive of other good effects.

From the two laſt obſervations, there does not ſeem to be an abſolute neceſſity for the particular care recommended in cleaning

fects. When applied juſt after the fall of the leaf, they contribute much to preſerve the wood of the delicate and tender kinds of peaches. I account for it thus.——It is allowed that our ſummers are in general too ſhort to perfect the wood of the tender kinds of peach and nectarine trees, without artificial means; and when the wood of theſe trees is imperfectly ripened, it is very ſubject to the canker, eſpecially if in the ſucceeding winter there happen a ſucceſſion of *rain* and *froſt*. This the Nurſery-man as well as Gardener often woefully experiences.

I conſtantly have obſerved that the *canker* originates at, or cloſe adjoining to, the *buds* of the laſt year's wood. The cauſe ſeems to be this. Wood imperfectly ripened is always ſoft and ſpungy, and therefore admits of imbibing a large portion of moiſture in rainy weather. The bud, and the fine capillary veſſels adjoining it, being ſurcharged with moiſture in a wet evening, when the froſt comes at night it freezes the moiſture in the veſſels, and cauſes it to expand, which, by tearing the veſſels aſunder, brings on a decay of the parts. Now the ſoap-ſuds ſeem to leave a gloſſy kind of coat or covering on the branches, and the oily particles contained in the ſuds, by penetrating them, prevent their being overcharged with moiſture.

But here it may ſeem ſtrange that oil ſhould act this friendly part, when it is well known to be ſo highly pernicious to plants in general. That it is ſo, in its genuine ſtate, cleaning every part of the Hot-houſe; nor even for a more material article, viz. the changing of the tan, which would be the principal part of the expence. Every other expence for a large Hot-houſe will come within the compaſs of a few ſhillings.

ſtate, is proved by daily experience. The general and received opinion of *wool* being poiſonous to plants, is from no other cauſe than from the oil contained in it.

But notwithſtanding that oil has this pernicious effect on plants, when in its original and genuine ſtate, ſtill, when made miſcible, perhaps nothing is more nouriſhing and friendly to them. This brings me to conſider ſoap-ſuds as a *manure* to the borders; for it is evident that by the rains and dews the principal of it does terminate there at laſt; and this important conſideration alone is ſufficient to recommend the practice.

It may ſeem unneceſſary to obſerve, that ſoap-ſuds contain a larger portion of oily particles after a common waſhing, than in the original ſtate.

I ſhall conclude this digreſſional note with obſerving, that ſoap-ſuds keep trees clear of moſs, and render the bark clear and healthy.

Although the reſult of the above obſervations ſeems to be founded on the greateſt appearance of *probability*, yet I do not affirm the leaſt circumſtance that is not grounded on *experience*. This account of my practice is given with the moſt ſcrupulous exactneſs, and from a careful peruſal of it, I dare venture to aſſert, that I have not omitted the minuteſt article. I therefore truſt and believe, that whoever ſhall purſue the ſame mode of practice, will, in the end, find his labours crowned with the ſame ſucceſs which I have hitherto had the good fortune uniformly to experience.

BOOK III..

On the different Species of INSECTS *that are ſound in* HOT-HOUSES, *with effectual Methods of deſtroying them.*

BESIDES the different ſpecies of inſects which are ſo pernicious to the Pine Apple plant, and which are deſcribed in the foregoing part of this work, there are other kinds of inſects in moſt ſtoves, which frequently prove very troubleſome: And though they are not injurious to the Pine Apple, are yet very prejudicial to moſt other plants kept there, either for uſe or ornament. It may therefore not be improper to bring them alſo under conſideration.

1. The Aphis*. This, I believe, is the moſt numerous of all the kinds of inſects in this Iſland: For in the ſpring months they ſeem in a manner to ſwarm upon moſt ſorts of trees, ſhrubs, and plants; and even in moſt ſoils the very graſs of the field abounds with them; for which reaſon they are generally termed

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* The Aphis is of the *Order* HEMIPTERA.

Its Characters are:

The roſtrum of the Aphis is bent inwards.

Their antennæ are ſetaceous, and longer than the thorax.

They have either four erect wings, or are without wings. Some authors aſſert that the male Aphides have wings, and that all the females are without.

Their feet are made for walking.

They have generally two little horns or hairs placed on the hinder part of their abdomen.

The Aphis has ſix feet, and the tarſi in each ſex have only one articulation.

The inſects belonging to this ſingular genus, in the ſummer bring ſorth live young, and in the autumn lay eggs. Entomologiſts aſſert, that from the copulation of the parents ſpring daughters, grand-daughters, great-grand-daughters, and great great-grand-daughters, or females fœcundated to the fifth (ſome aſſert to the ninth) generation.

the lice of the plants which they reſpectively infeſt.

The Roſe and Peach-trees are very ſubject to be over-run with theſe inſects, and if no means are uſed to extirpate them, they will, in a ſhort time, take ſuch intire poſſeſſion of the plants, that every part of the young wood will appear to be covered with them: They not only cauſe a ſtagnation of the juices, but alſo rob the plants of their nutriment, thereby reducing them to a weak ſtate.

The leaves of the Peach-tree, in particular, are often obſerved to be curled up, and covered with a ſweet clammy ſubſtance, which is ſolely owing to the quantity of theſe inſects which ſettle upon them. Beſides, many kinds of flowers and exotic plants which are kept in ſtoves, are very ſubject to be infeſted with them.

The Aphides are eaſily deſtroyed three ways: 1. By fumigating the houſe, in which the plants are kept, with tobacco. 2. By dreſſing the infected plants with ſnuff or tobacco-duſt. 3. By a decoction or infuſion of tobacco. The manner and application of all theſe will be hereafter conſidered.

2. The ACARUS *, commonly called the *Red Spider*. This is a peſt to almoſt every

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* The ACARUS is of the *Order* APTERA.

Its Characters are:

Two eyes placed on the ſides of the head, remote from one another.

Its mouth or proboſcis is formed by a ſmall-pointed roſtrum incloſed in a ſheath.

The antennæ are ſhorter than the proboſcis, and ſaid to be articulated and made like feet.

The head of the ſame ſize, and united to the thorax.

The Acarus has eight feet made for running.

There

every kind of plant, for this inſect is not only exceedingly pernicious to moſt plants kept under glaſs, but is alſo very prejudicial to many growing in the open air, particularly to ſome kinds of fruit-trees when trained againſt walls: As for inſtance, the Cherry, Plumb, Apricot, and Peach. When the Vine grows under glaſs, it is very liable to be greatly infeſted with this pernicious ſpecies, but I never knew the Acari attack it in the open air.

In hot dry weather the increaſe of theſe inſects is exceedingly rapid, and when they become numerous, they, by various means, ſoon make great havock on the plants: For this inſect, with its

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There are many ſpecies of this genus: ſome live upon other animals, quadrupedes, birds, and inſects; ſome of the laſt-mentioned claſs are often quite covered with them; others of them live in the water; others upon trees, plants, &c. They are oviparous.

proboſcis, perpetually wounds the fine or capillary veſſels of plants, and extracts their nutritious juices. It alſo works a web about the leaves, and over the tender buds and tops of the plants, in ſuch a manner as nearly to ſuffocate them, and prevent their vegetation.

3. The Thrips*. This is alſo a very pernicious ſpecies of inſect, and is very common in Hot-houſes, as well as upon plants in the open air. It is not ſo ge-

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* The Thrips is of the *Order* Hemiptera.

Its Characters are:

The roſtrum of the Thrips is ſmall and obſcure.

The antennæ are as long as the thorax.

The body is ſlender, and of equal thickneſs in its whole length.

The abdomen is reflexible, being frequently bent upwards.

The four wings are extended, incumbent upon the back of the inſect, narrow in proportion to their length, and croſs one another at ſome diſtance from their baſe.

The Thrips has ſix feet, and the tarſus of each foot has only two articulations.

nerally known as the two former genera, partly by reaſon of its minuteneſs (for the Thrips is in general ſo ſmall as to be ſcarcely perceptible) and partly from the manner of its concealing itſelf along the veins of the leaves of plants, from which it ſkips with great agility on being touched.

The Thrips is a great enemy to the Vine while the leaves are young and tender, eſpecially to the delicate ſorts, whether they grow in the open air or under glaſs; but in the latter caſe they are generally attacked with the greater ſeverity.

Theſe inſects are very common on many kinds of plants and flowers, and are generally very numerous on Peaches and Nectarines, eſpecially on that ſide of the fruit next the wall: In this ſituation they are of a larger ſize than thoſe uſually found on plants or flowers; and with great eaſe may be diſcerned by the naked eye, when the fruit is juſt gathered from the tree.

It is no uncommon thing to ſee in a Hot-houſe whole crops of French beans intirely deſtroyed by them, eſpecially late in the ſpring when the weather becomes warm. The Cape Jaſmine, as well as many other exotic plants, often fall a prey to theſe minute inſects.

The Thrips may be deſtroyed by the ſame methods as the Aphides.

The ONISCUS*, or *Wood-Louſe.*

As the Oniſci are exceedingly numerous

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* The ONISCUS is of the *Order* APTERA.
Its Characters are:
The antennæ are ſetaceous, and bent.
The mouth is furniſhed with two palpi.
The head is intimately joined to the thorax.
The body is of an oval form, and compoſed of ſeveral cruſtaceous plates.
The Oniſcus has fourteen feet.
The Oniſci change their ſkin like many other apterous inſects.
They are very common in houſes, gardens, and woods, and are generally called *Wood-lice.*

in moſt Hot-houſes, I ſhall on that account juſt mention them here, although I have never known them to injure plants except when firſt they riſe from ſeed: This, however, may be eaſily prevented by duſting ſnuff or tobacco duſt upon them when in that tender ſtate. The Oniſci breed in the tan, on which they ſeem in a great meaſure to ſubſiſt.

5. The COCCUS HESPERIDUM*, commonly called the *Brown Turtle Inſect*. This

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* The Coccus is of the *Order* HEMIPTERA.

Its Characters are:

The roſtrum of the Coccus is ſituate in the breaſt.

The hinder part of the abdomen is briſtly.

The Coccus has ſix feet.

The males have two wings, which, when at reſt, are incumbent.

The females are without wings.

The female Cocci fix themſelves and adhere, almoſt immovably, to the roots, branches, and leaves of plants, where they are viſited by the winged males, which are of a ſize conſiderably ſmaller. Some of them having thus fixed themſelves, loſe entirely the form and appearance of inſects;

This has been already deſcribed on account of its being generally found upon the Pine Apple plant: However, as it inhabits many plants both in the Hot-houſe and Green-houſe, I judge it proper to take notice of it again.

Theſe inſects may be deſtroyed, at a certain age, by fumigation: Therefore, in Hot-houſes where that operation is frequent, theſe inſects are rarely to be met with.

6. The

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inſects; their bodies ſwell, their ſkin ſtretches, and becomes ſmooth, the ſegments of their abdomen diſappear, and they ſo much reſemble ſome kinds of galls or excreſcences found frequently on the leaves and branches of plants, that in general they are miſtaken for ſuch.

In ſome ſpecies the males are but few in number, in proportion to the females, and their duration is exceedingly ſhort.

6. The FORMICA*, or *Ant*. Theſe are often exceedingly numerous in Hot-houſes, and eſpecially where the Aphides and Coccus Heſperidum abound; for there is a ſweet glutinous matter which iſſues from theſe inſects (being either the excrement of the inſect, or produced by

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* FORMICA, or ANT, is of the *Order* HYMENOPTERA.

Its Characters are:

The Antennæ form an angle, their firſt articulation being very long in proportion to the others.

The mouth is armed with jaws.

The abdomen is joined to the thorax by a ſhort ſtalk.

The females and neuters are armed with a ſting, which is concealed within the abdomen.

The males and females are winged, the neuters have no wings.

The Ant has ſix feet.

The Ant lives in ſocieties compoſed of males, females, and neuters; the males are much ſmaller than the females and neuters, but are diſtinguiſhable from the largeneſs of their eyes, which are not ſo well proportioned to the ſize of their bodies as in the other ſexes.

No ſooner is the work of generation performed, than the male and female Ants periſh, as well as moſt of the neuters; ſome of theſe, however, outlive the winter, but paſs that ſeaſon in their habitation, without movement, or any ſigns of life.

it from ſome other cauſe) that ſeems to be the principal incitement that draws the Ant thither.

The Ant may be deſtroyed with great facility, by ſetting pots containing honey and water, in the ſame manner as is practiſed for catching waſps and flies.

7. The GRYLLUS*, or *Cricket*. Crickets uſually abound in Bake-houſes and

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* The head of the GRYLLUS is inflected, armed with jaws, and furniſhed with palpi.

The Antennæ, in ſome ſubjects, are ſetaceous, in others, filiform.

The wings are declined towards, and wrapped round the body; the under ones are folded up, ſo as to be concealed under the elytra.

All the feet are armed with two nails or two crotchets; the hind ones are formed for leaping.

The Grylli are divided into different ſections as follows:

1. The ACRIDÆ.
2. The BULLÆ.
3. The ACHETÆ. } The Houſe-cricket belongs to this family.

4. The

and warm habitable buildings; but as they are furniſhed with wings, and during the hot months in ſummer make excurſions in the open air, they are conſtantly found in dry banks and hedges; conſequently every Hot-houſe is liable to be infeſted with them.

When once a Hot-houſe gets infeſted with Crickets, the great fire heat uſually kept ſerves to encourage their increaſe, and they ſoon thereby become very numerous.

4. The TETIGONIÆ.
5. The LOCUSTÆ.

The larvæ, or caterpillars, of the Grylli, very much reſemble the perfect inſects, and, in general, live under ground.

The Chryſalids very much reſemble and accompany their parents, many of which feed upon the leaves of plants. Others, which live in houſes, prefer bread, meal, and every kind of farinaceous ſubſtance; ſome of them are with us called *locuſts*, others *graſs-hoppers*, others again, *crickets*.

I have known, in ſome Hot-houſes, great depredations having been committed by this ſpecies: For when they become numerous they do not content themſelves in preying upon the foliage of plants only, but even attack the fruit alſo.

Crickets too are very prejudicial in Hot-houſes on another account; for they work the lime out from between the courſes of the brick-work in the flues, &c. to their great detriment.

Crickets may eaſily be deſtroyed by a mixture of oatmeal, ſugar, and arſenic.— A ſmall quantity of the latter will ſuffice for a large proportion of the two former ingredients.

The mixture ſhould be laid in ſmall quantities in different parts of the ſtove.

And it will be neceſſary to repeat the applications at intervals for two or three weeks, until the whole are exterminated.

To prevent accidents great care ſhould be had in the application.

Having now deſcribed the different ſpecies of inſects that infeſt Hot-houſes in general, I ſhall next proceed to give directions for extirpating them; after which I ſhall lay down ſome rules for keeping the Hot-houſe tolerably clear of them. I ſay *tolerably* clear, for it will be proper here to obſerve, that the caſe of theſe indigenous inſects is very different from that of ſuch as are exotic and peculiar to the Pine Apple plant: For a Hot-houſe being once cleared of *them*, will remain ſo for ever, provided no freſh plants are taken in from abroad or elſewhere; but the ſeven ſorts of inſects laſt mentioned, are likely to continue to perplex and give the Gardener everlaſting vexation; particularly the Acarus and Thrips, which are the moſt pernicious. They are natives, abound in every garden, and in warm dry weather are poſſeſſed of ſuch agility, that ſuppoſing a Hot-houſe perfectly clear of them to-day, it may probably not be ſo to-morrow; and when once theſe intruders have entered into poſſeſſion, their increaſe is ſo rapid that they ſoon become exceedingly numerous.

On Fumigating the Hot-houſe.

THE method of performing this operation, either by the bellows or ſmoaking-pot, is ſo generally underſtood, that a deſcription may here ſeem unneceſſary. I ſhall nevertheleſs give a few hints on the ſubject, which I truſt will be of ſervice.

Firſt, The moſt eligible ſeaſons for fumigating the Hot-houſe are the ſpring and autumn; when, if need require, it ſhould be repeated every eight or ten days. In the ſummer it ſometimes happens that this operation is attended with inconvenience from the heat of the weather, but more eſpecially when Vines grow in the Hot-houſe; for at the time their fruit is near ripe, it would be liable to give it a ſmoaky flavour.

Fumigation is beſt performed late in an evening, and proves moſt efficacious when the weather is moiſt and calm; for the ſmoak is retained much longer in the houſe when the air is ſtill, and the cavities in the roof, particularly thoſe between the ſquares of glaſs, filled with moiſture.

The Aphides may be deſtroyed with a gentle fumigation; but the Thrips and Coccus Heſperidum require a ſmoak ſo ſtrong, that a perſon cannot diſtinguiſh an object further than at the diſtance of four or five feet.

When a Hot-houſe is greatly infeſted either with the Aphides or Thrips, the fumigations ſhould be repeated every third or fourth night for three or four times, and then one may proceed according to the former directions: The reaſon and neceſſity of theſe repetitions proceeds from a probability that the ſmoak cannot affect the inſect in the egg, and perhaps it may not have much power over them in ſome other of their ſtates;

therefore a freſh brood may naturally be expected in the courſe of a few days.

Some are of opinion that it is of great uſe to fumigate Hot-houſes conſtantly every eight or ten days (whether it is required or not in reſpect of inſects) alledging that the ſmoak will contribute to the vigour of the plants: But from this I muſt beg leave to diſſent, as nature ſeems to ſtand in need of no ſuch ſuperfluous aſſiſtance. I muſt acknowledge, however, that I have found no inconvenience from this practice, when uſed with the moderation here deſcribed. The expence attending it is very inconſiderable, as tobacco grown in this country will anſwer the purpoſe very well.

The Acarus does not ſeem to be affected by fumigations made with any ingredient that I could hitherto diſcover, and I am inclined to think that the apterous inſects, or thoſe without wings, are not ſo much affected by fumigations as the winged tribe. Indeed this ſpecies of inſect has hitherto been eſteemed unconquerable, for which reaſon I flatter myſelf that what I have to offer on this head will not be the moſt unacceptable, or leaſt uſeful part of this Treatiſe; for, from repeated trials, I can venture to aſſure my readers, that the mixture recommended for deſtroying the inſect on the Pine Apple plant, will have the ſame effect on this ſpecies alſo. It not only deſtroys the inſects actually exiſting on the plants at the time of the operation, but alſo totally prevents their eggs from coming to maturity, and conſequently ſecures us from the danger of a ſucceeding brood, without the leaſt injury to the plants. However, notwithſtanding this fair and promiſing proſpect, I cannot but very ſincerely lament that the benefits of this method do not extend ſo far as to be very ſerviceable either to melons in frames, or fruit-trees growing againſt walls in the open air: But as it will be found exceedingly uſeful to plants kept in Hot-houſes in general, I ſhall give ſuch directions reſpecting its application as I have found beſt to anſwer the purpoſe.

Plants greatly infeſted, and growing in pots, when their tops are not very large, may, with great facility, be dipped in a convenient veſſel filled with the mixture recommended for the Pine inſects, and which ſhould be kept warm during the operation. The top of the plant need only remain a few ſeconds in the mixture, and it ſhould then be ſet in a cloſe ſhady place, (a Green-houſe is very proper in an evening after the ſun is gone off the windows) to prevent its drying too rapidly.

Two or three days after the operation, the top of the plant ſhould be refreſhed with clean water; and from that time a gentle ſprinkling may be given it conſtantly, which will greatly accelerate its growth.

The Acari moſt generally reſide on the *under-ſide* of the leaves of plants, and when they are very numerous they work ſo thick a *web* thereon, that it ſometimes prevents the mixture from entering into certain hollow parts of the leaves of ſome kinds of plants, by which means a few inſects eſcape unhurt; in which caſe it will be proper for the plants to undergo the ſame operation the ſucceeding evening, which will moſt aſſuredly deſtroy all that have eſcaped the former operation.

I have taken the liberty to mention this particular, leſt ſome perſons might condemn the method here recommended as ineffectual, without taking the trouble of attending to the cauſe of its failure.

Large, or climbing plants, when their leaves are large, as for inſtance, the *Vine*, muſt be dreſſed with the mixture by means of a *ſpunge:* This has the appearance of a tedious operation; but in a dark day, when the Hot-houſe is not very warm, a perſon will make a great progreſs therein in the courſe of a few hours.

The following mixture I have found to be equally efficacious with the former; and although it is not ſo proper to be applied to exotic plants, on account of its diſagreeable ſmell, it ſeems very likely to be of great uſe to fruit-trees againſt walls, as well as to melons in frames, which alſo are often much injured by the Acarus.

Take two ounces of ſoft green ſoap;
One ounce of common turpentine;
One ounce of flowers of ſulphur.

Put theſe ingredients into a proper veſſel, and pour upon them one gallon of boiling water. Let the whole be well worked together with a whiſk, which will bring it to a ſtrong lather, and cauſe the ingredients to incorporate.

The mixture muſt be uſed milk-warm, and kept gently ſtirring, during the time of uſing, to prevent the ſulphur from ſubſiding.

As the Acari generally reſide on the *under-ſide* of the leaves of plants, from the poſition of wall-trees, it is impoſſible for any external application to deſtroy the inſects that are ſo ſituated: However, it is very probable that the ſtrong ſmell of the turpentine and ſulphur may be ſo diſagreeable as to cauſe them to change their reſidence, and to ſeek for refuge on other plants.

I muſt beg leave to obſerve, that I think this mixture may be of conſiderable uſe in preventing the mill-dew on the Peach and Apricot: For ſulphur alone retards the progreſs of that moſt fatal diſorder, and the ſoap and turpentine render the mixture of a ſlimy conſiſtence, and leave a clammy coat or covering on the leaves, of a gloſſy appearance, which very likely may contribute to ſtop the progreſs of that diſorder. But the fruit-trees here having been conſtantly clear of the mill-dew, I have therefore not had an opportunity of making any other experiment with it than upon exotic plants, on which it had the deſired effect, and the plants did not ſeem to have ſuſtained the leaſt injury.

I ſhall obſerve, that this method ought by no means to be practiſed on fruit-trees near the time that their fruit is ripening, as the mixture would probably diſcolour the fruit, and render it diſagreeable to the taſte.

But melons in frames may be ſprinkled with it at all times when they require it, becauſe that fruit may eaſily be covered with a cabbage leaf, or any thing of the kind, at the time of the operation.

A ſtrong lye, made of wood-aſhes, will likewiſe deſtroy the Acari; but that, as well as *briny* and *ſpirituous* compoſitions, ought never to be applied to plants, becauſe they greatly injure them, and commonly cauſe their leaves to fall off.

Having given directions for extirpating the more pernicious kinds of the inſects above deſcribed, when numerous, I ſhall now ſuggeſt a few hints that may be found uſeful in preventing their becoming ſo.

Firſt, The Acarus may be deſtroyed with good effect on the Vine, or any other plant that has large leaves of a firm texture, by the following method:

Take a ſmall bruſh, ſuch as is uſed for common painting, the briſtles of which ſhould be long, ſoft, pliable, and quite dry at the time of uſing; then one hand being laid flat on the upper ſurface of the leaf, draw the bruſh gently with the other two or three times, backwards and forwards, on the under-ſide.

The body of the Acarus being very ſoft, and its conſtruction exceedingly delicate, it is therefore deſtroyed with the moſt gentle touch. Beſides, the bruſh moſt readily wipes off their web, as well as their globular tranſparent eggs, which are, by a fine membrane, faſtened to the leaves of plants; on which ſometimes they are ſo exceedingly numerous, as even to aſtoniſh the beholder when looked at through a proper glaſs.

The operation is moſt readily performed, and very greatly retards the progreſs of this moſt pernicious inſect. The bruſh being ſo ſoft in its nature, does not, if any tolerable degree of care and attention be given, in the leaſt incommode or injure the plants.

Secondly, The duſting of plants frequently with flowers of ſulphur is very diſguſtful to the Acari, and prevents their increaſe. In Hot-houſes or Melon-frames, where ſulphur is frequently and plentifully uſed*, that inſect never makes

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* The moſt effectual way of uſing ſulphur for the deſtruction of the Acari in general, is, by ſpreading it all over the top of the flues, and particularly that part of the flue near the fire-place where it is generally kept very hot.

Some think waſhing the walls and flues with a mixture of ſulphur and water with a little unſlacked lime and ſize (juſt any great progreſs; but the ſmell of the ſulphur renders the Hot-houſe exceedingly diſagreeable.

The beſt method of applying ſulphur is, to puff it on the plants by the help of a ſmall engine, ſuch as is uſed by hair-dreſſers, and the plants ſhould be in a moiſt ſtate at the time of the operation. The ſame engine will, with great facility, throw ſnuff, or tobacco-duſt, upon plants infeſted with the Aphides or Thrips*.

Thirdly,

(juſt to ſet the waſh) has alſo been attended with good effect. But much depends on the nature of the ſulphur uſed. The beſt ſulphur for this purpoſe is that made by a ſlow proceſs. Native ſulphur is alſo ſometimes uſed for the above intention.

* The efficacy of flowers of brimſtone, in deſtroying the ſcaly inſect on Pines, has been confirmed by the experience of many; when lightly puffed upon the plants, with a Hairdreſſer's puffing machine, the ſulphur will, in once or twice uſing, hardly leave one in ten thouſand of theſe inſects alive, and with very little repetition now and then, will perfectly clear the houſe of them, without the leaſt damage to the plants.

Thirdly, The keeping of a Hot-houſe in a moiſt ſtate, by watering the walks and flues late in an evening, and the frequent ſprinkling of plants with water, contributes to retard the progreſs of inſects, particularly the Acari, which are very impatient of moiſture. Water will inſtantly reduce them to a ſtate of inaction; and this has induced ſome to believe that it will deſtroy them: But I have often put the tops of plants, infeſted with them, under water for ten or twelve hours, and always found them recover their uſual vivacity and vigour as ſoon as they became dry.

Fourthly, During the hot ſummer months, the dipping the tops of plants frequently in clean water will clear them of many inſects; and if performed late in an evening is wonderfully refreſhing, and any great progreſs; but the ſmell of the ſulphur renders the Hot-houſe exceedingly diſagreeable.

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Fourthly, During the hot ſummer months, the dipping the tops of plants frequently in clean water will clear them of many inſects; and if performed late in an evening is wonderfully refreſhing, and greatly accelerates their growth. But if a little tobacco be added to the water, ſo as to make a mild infuſion, and alſo a ſmall quantity of flowers of ſulphur, juſt at the time of uſing, it will be more efficacious in reſpect to inſects, and not leſs refreſhing to the plants.

In this operation there is no neceſſity for the top of the plant to remain under water longer than a few ſeconds.

Laſtly, Beſides the advantages which plants receive from being at all times kept clear of inſects, they have other benefits ariſing from cleanlineſs. I therefore ſtrongly recommend the keeping every part of a Hot-houſe clear of dirt, as it will greatly contribute to the health and vigour of the plants. To obtain this deſirable end, let the inſide of the roof be kept duly painted: Let the pots at all times be kept clean of weeds and moſs, and their tops conſtantly refreſhed with freſh mould: See that the faded flowers and leaves be taken off before they decay, which otherwiſe would tend to render the air in the houſe impure: Obſerve alſo to keep the walks and flues particularly clean from every ſort of dirt. For we ſhould always bear in mind that the vegetable, as well as the animal creation, delights in cleanlineſs.

FINIS.

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EXPLANATION of PLATE VI.

a a Pits for fruiting Pine-plants.

b b Pits for ſucceſſion, or young Pine-plants.

c c Front wall.

d Fire-place partly in the front wall, which is worked only in very cold weather. For the method of making the fire-places, ſee p. 93.

e e e Flue.

f Ciſtern which receives the water that falls on the roof of the Hot-houſe.

g g g g g g g Walks in the ſtove.

h h Small porches which cloſe with double doors at the entrance of the ſtove.

i i Fire-places in the middle of the back wall, which communicate with the flues *k k*.

l l Fire-places at the ends of the back wall, which communicate with the flues *m m*.——N. B. The flues *m m* make one return, as repreſented in the ſection.

n n n Cloſe fire-houſes.

o o Open ſheds.

p Pipe that conveys the water to the ciſtern. See the method explained, p. 84.

q Level of the border in front of the ſtove.

r Foundation of the front wall.

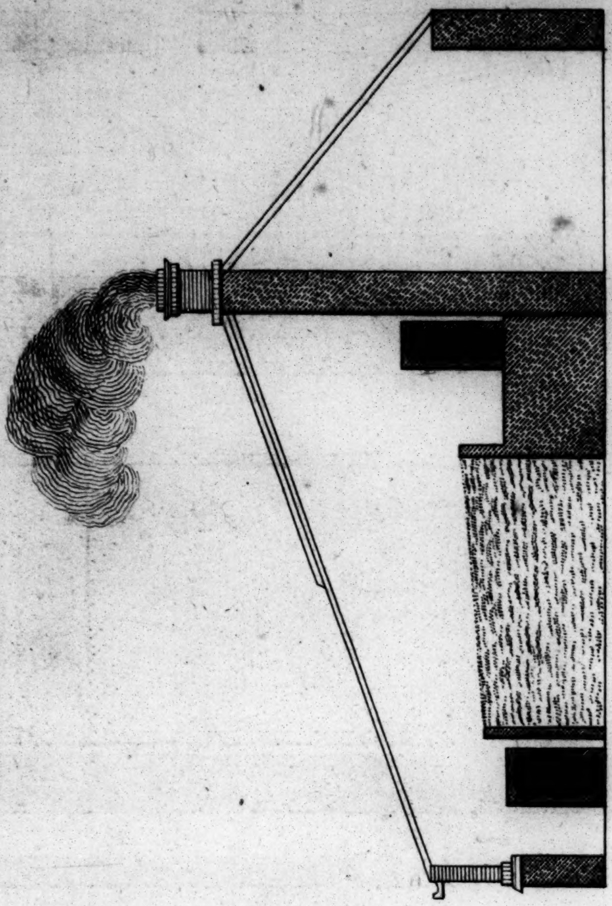
s Apertures, or holes through which the vines are conveyed.

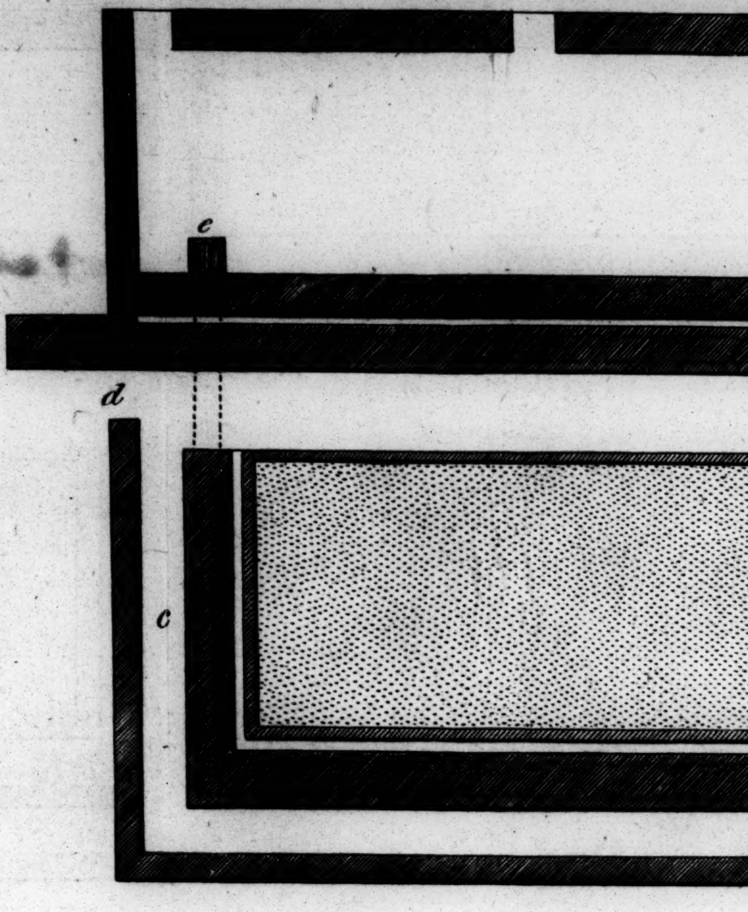
t Stone in front, with a groove to receive the water that falls from the roof. This method explained, p. 83.

u v w Top, middle, and lower lights. See the method of putting in the ſquares of glaſs explained, p. 101.

A PLAN of a PI

Section.





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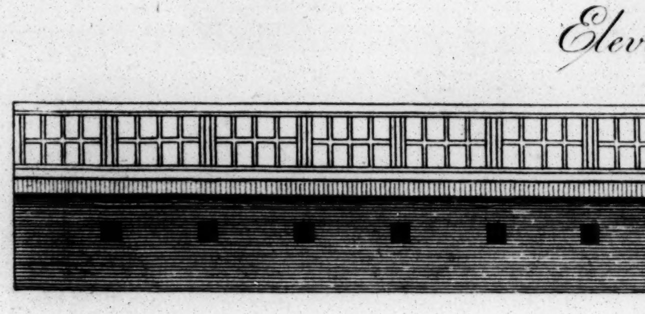
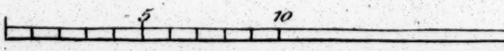


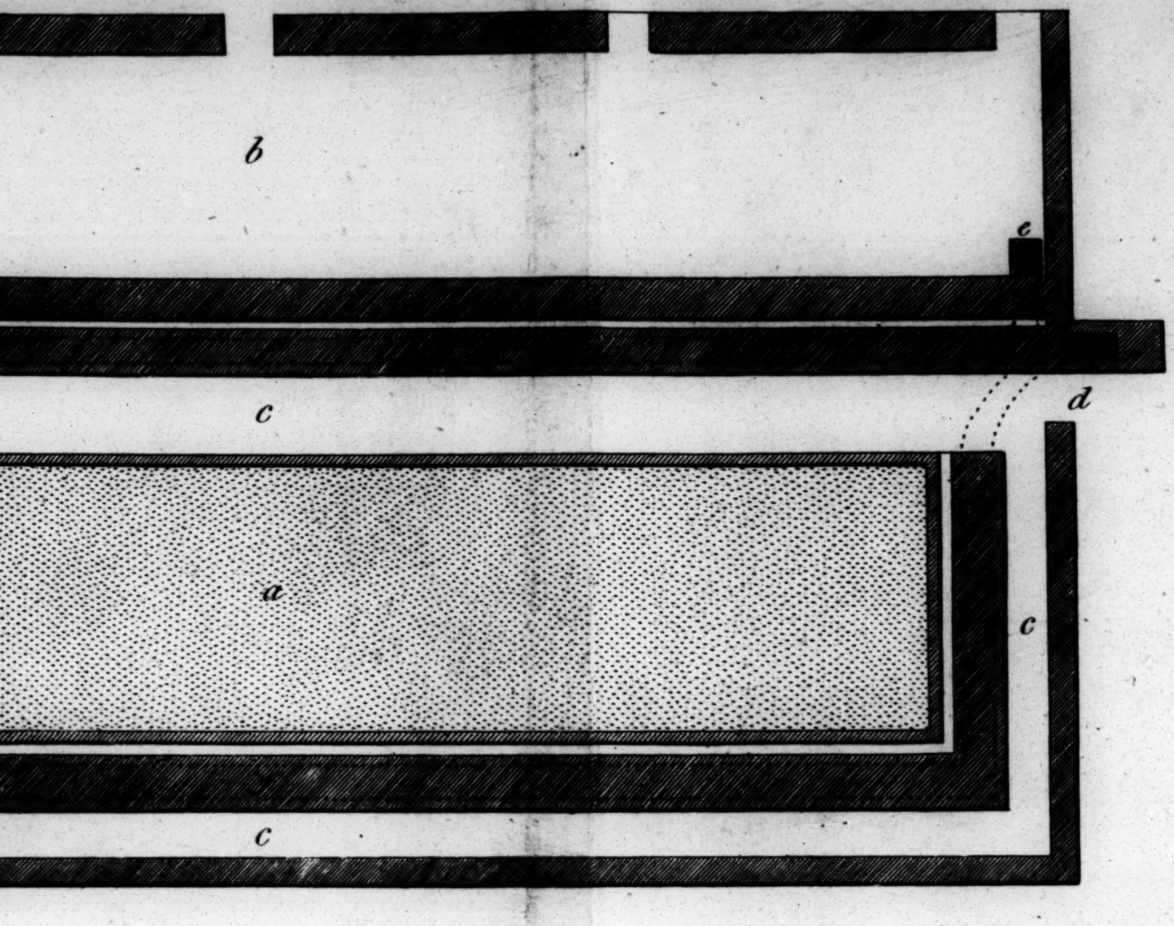


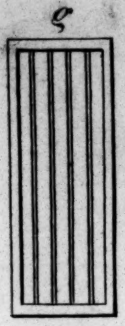
a.....Pine pit.
b.....Sheds.
cccc. Walks.
dd.. Doors.
ee... Fire places.
ff... Flues.
gh.. Upper & lower lights.

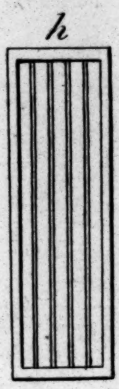
W. Speechly del.

Publish'd Augt. 1st 1795 by Wm.

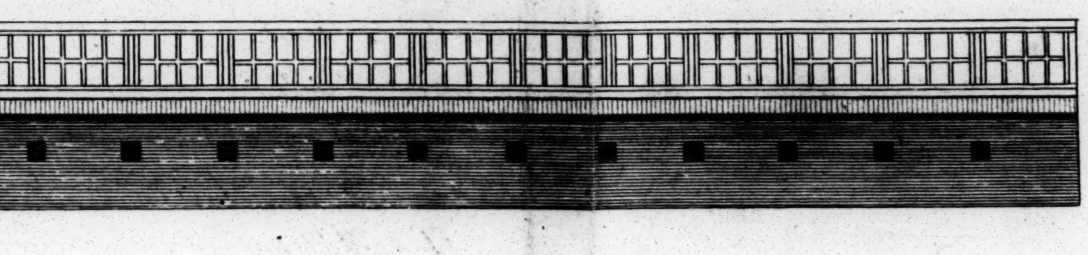
PINE STOVE, &c.







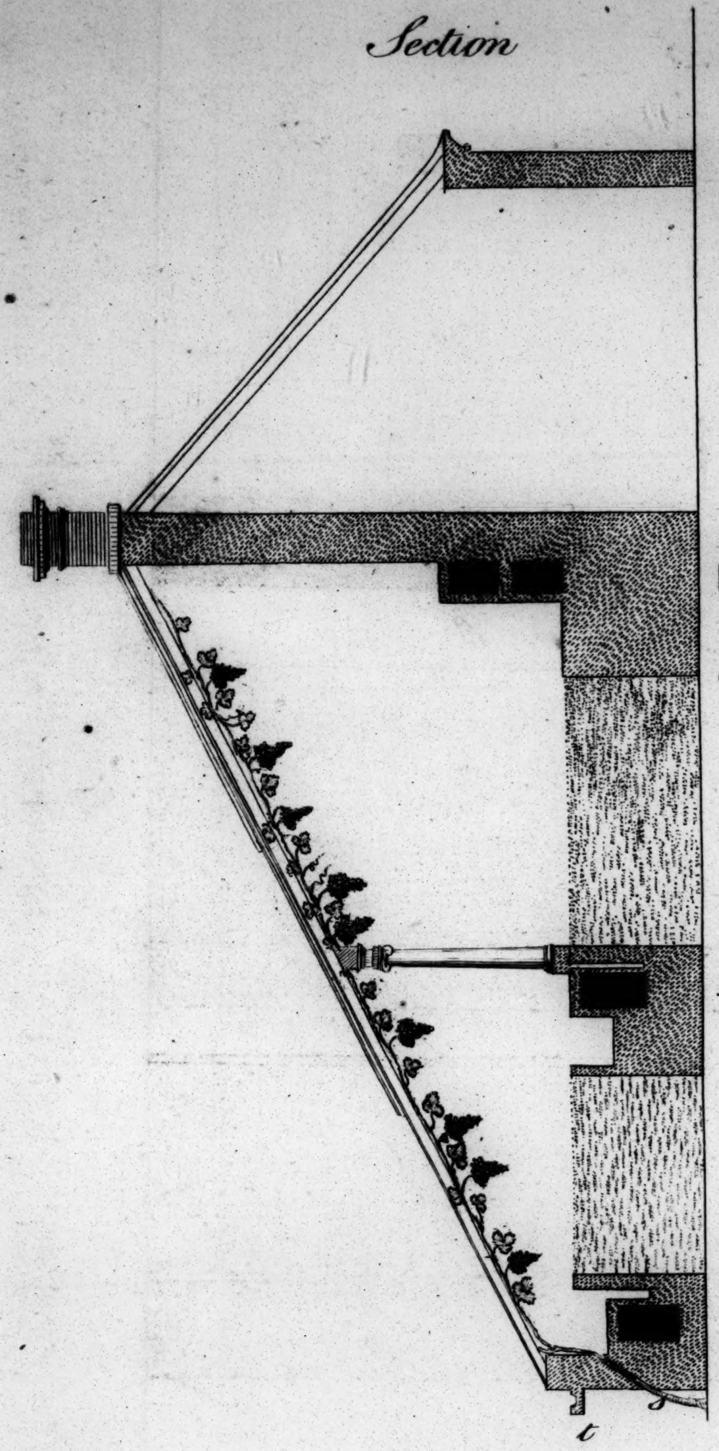
Elevation of the Front Wall.

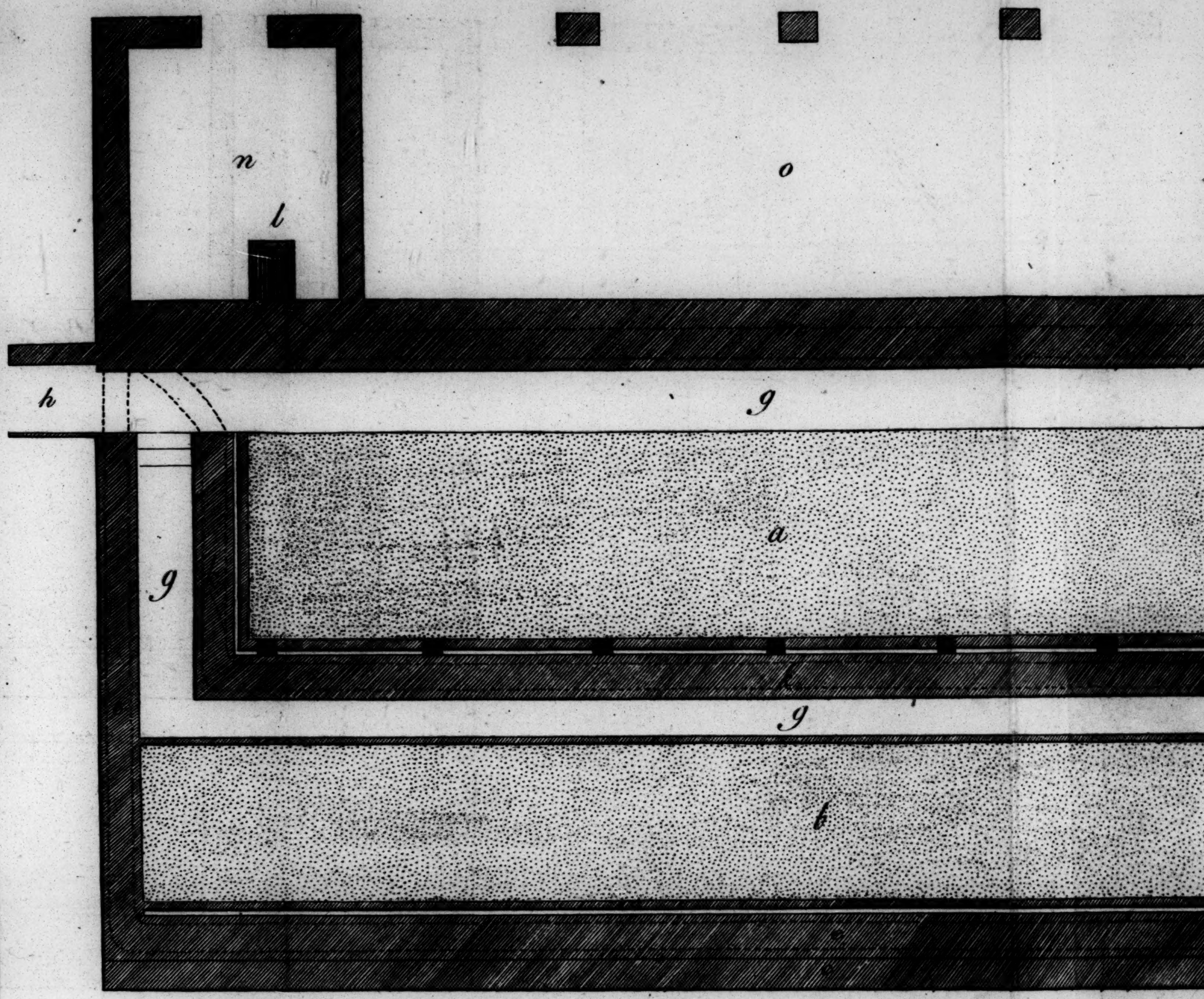


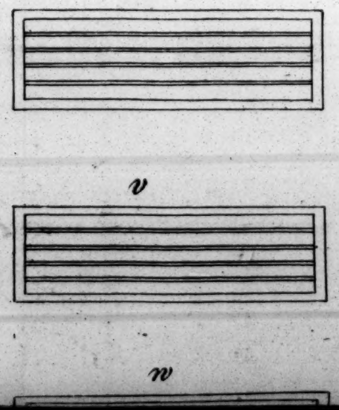
J. Wigley. Sc.

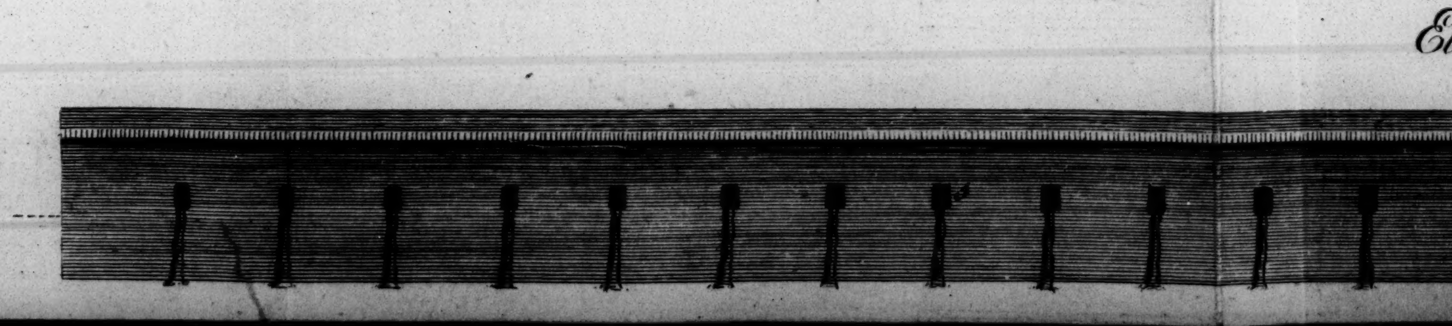
5 by Wm. Speechly, as the Act Directs.

A PLAN *of an approved* PINE *a*





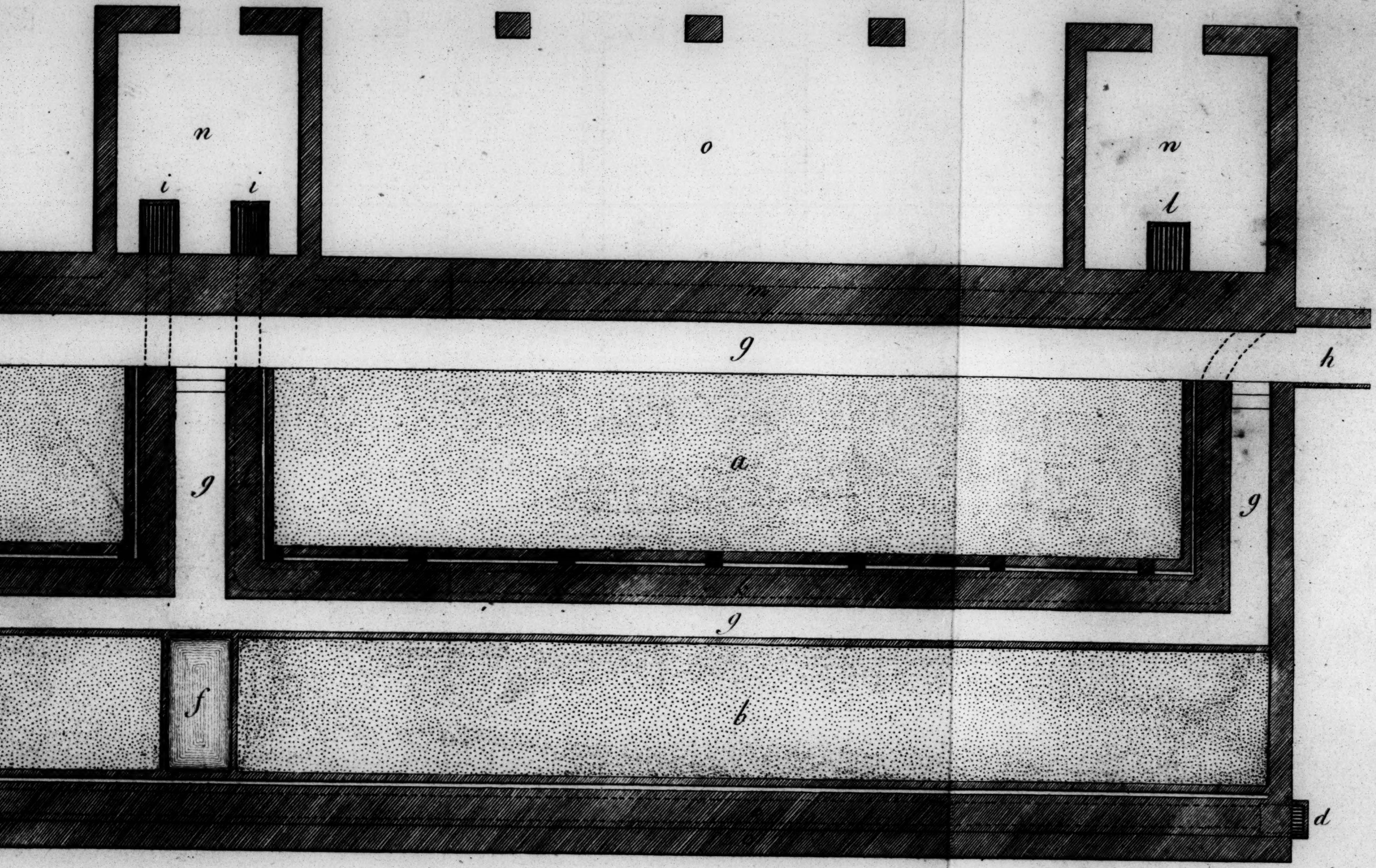




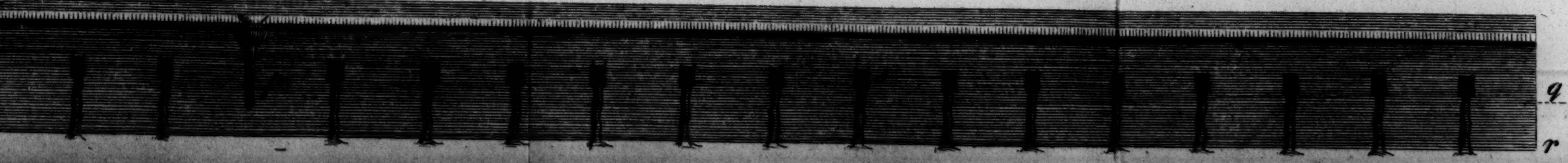
NE and GRAPE STOVE.

Plate VI.

Ground Plan.



Elevation of the Front Wall



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